Journal of
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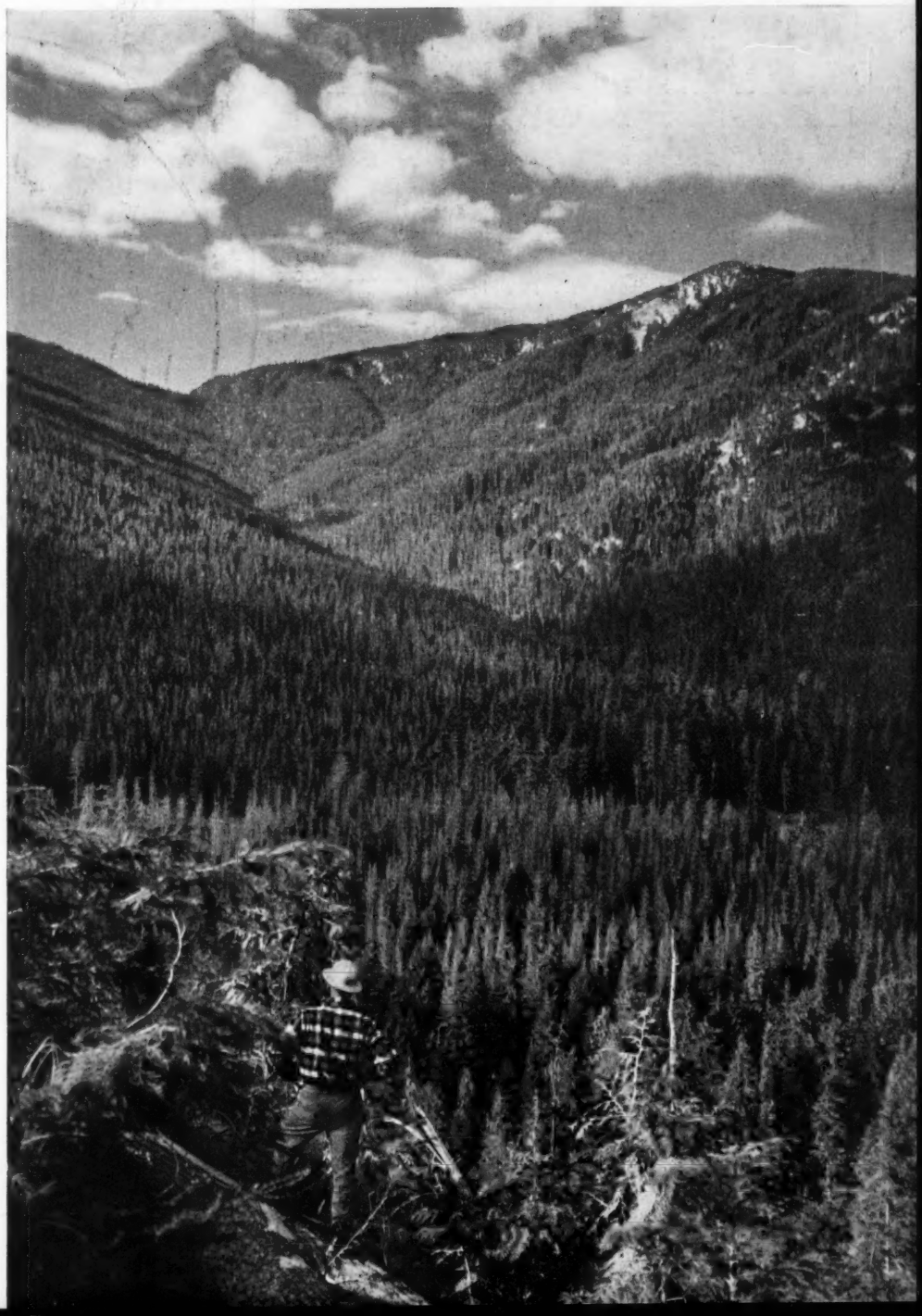
June 1958



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Volume 56
Number 6

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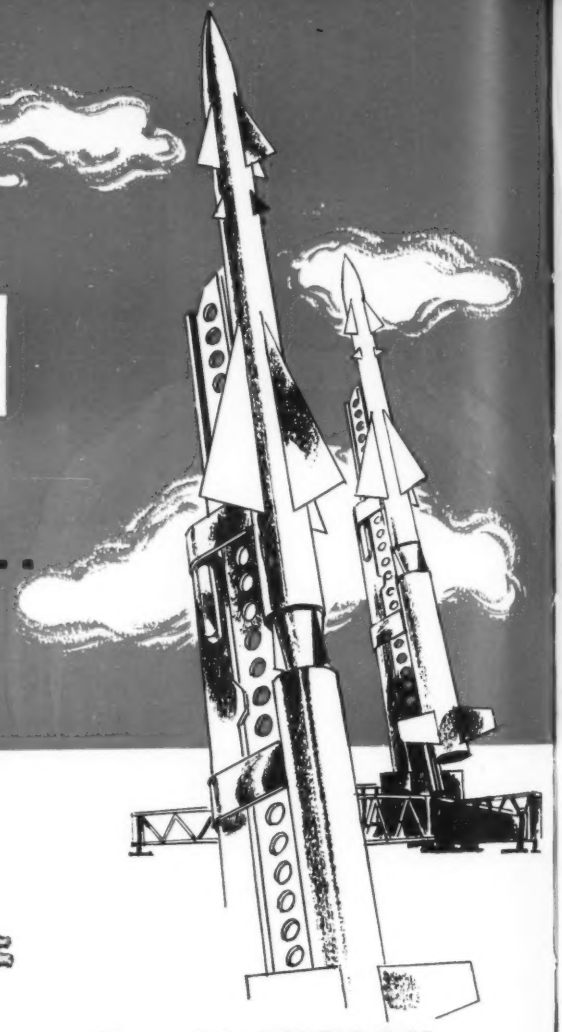

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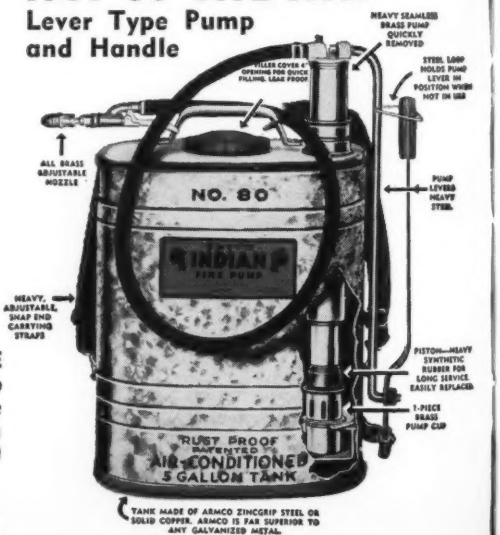
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CONTENTS

Cover: Northwestern Montana Timberland Supporting a Stand of Douglas-Fir, Larch, Ponderosa and White Pine.
(See p. 428. Photo courtesy of St. Regis Paper Company)

Theodore Roosevelt, Forester ..... *Martha Meelig* 387

Is Price Reporting for Standing Timber Feasible? ..... *John Zivnuska* and *Ann Shideler* 393

Forest Fire Research Needs in the South ..... *Ralph M. Nelson* and *David Bruce* 399

Rate of Spread and Intensification of Dwarf-mistletoe in Young Lodgepole Pine Stands ..... *Frank G. Hawksworth* 404

A 10-Year Record of Pine Seed Production on the Hitchiti Experimental Forest ..... *E. V. Brender* 408

Artificial Ripening of Douglas-Fir Cones ..... *Roy R. Silen* 410

The Small Oak Barkbeetle Transmits the Oak Wilt Disease ..... *W. D. Buchanan* 414

Deer Browse Production from Felled Trees in the Northern Hardwood-Hemlock Forest Type ..... *J. H. Stoeckeler, John M. Keener,* and *R. O. Strothmann* 416

Age of Rough (Ground Cover) Affects Shortleaf Pine Establishment and Survival ..... *E. R. Ferguson* 422

Propagation of Several Species of Acer by Cuttings ..... *L. J. Enright* 426

Notes 429

The Heber Trick Tank—A Cistern for Stock Water; Longleaf Pines can Form Vigorous Sprouts; Robert Louis Stevenson on Forest Influences; Soil Depth Affects Windfirmness of Longleaf Pine.

Points of View 433

Comments on "Effects of Silvicultural Practices on Wildlife Food and Cover in Oak and Aspen Types in Northern Michigan."

Reviews 434

Timber Resources for America's Future; Sawdust Empire: The Pacific Northwest; The New Way of the Wilderness; Publications of Interest.

Current Literature 437

Society Affairs 438

Forestry News 456

Index to Advertisers 464

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Journal of Forestry

Official Organ of the Society of American Foresters

Theodore Roosevelt, Forester

Martha Meelig
Librarian, State University College of Forestry at Syracuse University, Syracuse, New York

The year 1958 marks the centennial of the birth of Theodore Roosevelt. The Congress of the United States in 1955 created the Theodore Roosevelt Centennial Commission to prepare for a suitable celebration of the centenary. Since some of the major efforts of Roosevelt's life centered on conservation, it is fitting that much emphasis is being given to a review of his accomplishments by various conservation groups through publications and other suitable expressions. Outstanding was the part he played in moulding a sound national philosophy and launching a nation-wide action program in forestry. By the publication of this article the JOURNAL *pays tribute to Theodore Roosevelt's inspired leadership in the field of American forestry.*

AT THE early age of ten Theodore Roosevelt had already become "Proprietor of the Roosevelt Museum of Natural History," starting with the skull of a seal "preserved" from a Broadway market. This childhood interest in natural science nearly cost the young profession of forestry its most forceful political champion-at-large. Discouraged in following his youthful purpose to become a scientist by the confining aspects of the laboratory, he turned his college activities toward subjects pertaining to political economy, graduating from Harvard in 1880.

Although he never received formal training as a forester, T. R. early in his career recognized the place the new profession should take in the welfare of his state and nation. Having all the qualities he was later to require of men interested in forestry training—love of the forest, courage, rugged health, a strong will to accomplish his aims, ability to overcome adversity, to take criticism—it is no wonder that he was to become the political force needed by the new profession to get it across to the people.

In 1881, only one year out of college, T. R. was elected to the New York Assembly. Here he began the groundwork for what was to become the colossal program of conservation as we know it today.

In the *New York Tribune* datelined Utica, February 21 (1885) there appeared an article, "Forming a Forestry Association." It reads, "A meeting to form a State forestry association was held in this city today. . . Theodore B. Roosevelt [then Assemblyman] made an address on the importance of creating public sentiment in favor of forest preservation. . ."

During this same year legislation was passed establishing the

Teddy's Newest School

Minneapolis *News*, May 13, 1908

New York State Forest Commission.

Several years and a brilliant career in the White House later, T. R. made this significant statement, "All that later I strove for in the Nation in connection with Conservation was foreshadowed by what I strove to obtain for New York State when I was Governor."

Throughout a career filled with stupendous demands from other interests and forces he never neglected his early conviction that the importance of forest preservation must be brought to the people.

During 1958 New York State celebrates its 75th anniversary of the signing of the Civil Service Law, the bill having been introduced by T. R. at the 1883 session of the State Legislature. This was a forerunner of his insistence that trained foresters be employed in the federal forest service.

Cognizant of the basic importance of forest preservation to overall conservation of the national resources he was able to give the profession the legislative and political push it so sorely needed to put into action its principles. Because of his support and dynamic aggression in its cause he was made an Associate Member of the Society of American Foresters, an honor not too easily acquired by those not so trained. His conservation policy of which forestry was a major factor was later to be called, above all his other great contributions, his greatest to the world. He lacked only the few short years of formal training to be one of the greatest of the small group of "foresters" of his day.

He sought the opinions of trained men in the forming of the new forest policies. When these policies were decided upon he spared no effort, or means, to put them into effect. Even as Governor of New York he had time to consider the opinions of men in the profession regarding the best plan for heading the new State Forest Commission. Gifford Pinchot related this particular instance that indicates Roosevelt's characteristic of adhering to the business at hand, whether of state importance or just a commitment to children. Mr. Pinchot stopped at the Governor's mansion in Albany on his way to the Adirondacks. He arrived during an imaginary attack by a band of Indians, and the Governor was helping the houseful of children to escape by lowering them out of a second-story window on a rope. Only after all had been rescued did he give Mr. Pinchot his attention for the serious business of government planning! This ability to adjust himself to the circumstance and to the people involved was to be the factor in countless situations to speed up action in the promotion of policies that under control of others may have remained only in the discussion phase. This characteristic of easy application was also apparent in his speaking and writing whether writing to his children or addressing a legislative or professional convention.

In his annual message of 1900 as Governor he declared, "We need to have our system of forestry gradually developed and conducted along scientific principles. When this has been done it will be possible to allow marketable lumber to be cut everywhere without damage to the forest."

He thus promoted serious recognition of the young profession struggling against indifference and political animosity.

T. R. As President

In 1901, at the age of 43, T. R. became the 26th President of the United States. Forestry could have had no better advocate had one of its own professionals been elevated to the office. His early interest and his political experience gained in New York State combined at once to push forestry into its rightful place. His first work, according to his own words, "was the work of reclamation." He recognized the approaching crisis in the state of the nation's resources and created four great commissions serving without pay—the Commission on Public Lands, the Commission on Inland Waterways, the Commission on Country Life, and the Commission on National Conservation. Forestry was an important factor in the work of all of these.

In his first message to Congress on December 2, 1901 he pointed out the responsibility for the forest reserves, at that time divided between the Department of the Interior and the Department of Agriculture. He forcefully presented the facts.

> The fundamental idea of forestry is the perpetuation of forests by use. Forest protection is not an end in itself; it is a means to increase and sustain the resources of our country and the industries which depend upon them. The preservation of our forests is an imperative business necessity. We have come to see clearly that whatever destroys the forest, except to make way for agriculture, threatens our wellbeing.
>
> The practical usefulness of the national forest reserves to the mining, grazing, irrigation, and other interests of the regions in which the reserves lie has led to a widespread demand by the people of the west for their protection and extension. The forest reserves will inevitably be of still greater use in the future than in the past. Additions should be made to them whenever practicable, and their usefulness should be increased by a thoroughly business-like management.
>
> These various functions should be united in the Bureau of Forestry. . .
>
> The water supply itself depends upon the forest. . . The forest and water problems are perhaps the most vital internal questions of the United States. . .

This message gave to forestry a stature it had not known before and a shove to its companion interests in the conservation of national resources. It precipitated a staggering amassing of reports, technical papers, speeches, and magazine articles on existing forests. These led to the setting aside of forest reserve areas in an amazingly short period of time so that by 1909 more than 234 million acres of public land were withdrawn from private entry either permanently or for a time, more than 148 million acres becoming national forests, the transfer of forest reserves from the Department of the Interior to the Department of Agriculture's Forest Service and its professionally trained foresters, the establishment in 1910 of the Forest Products Laboratory at Madison, Wisconsin, public lands reserved for water-

power sites or irrigation, the Weeks Law in 1911 establishing a new national policy on the purchase of forest lands by the federal government for the protection of the flow of navigable streams and federal-state cooperation in fire protection, the Phillipine Forest Act of 1904 regulating use of the forests, the Division of Forestry created in Hawaii. State legislatures all over the country began to set up departments of forestry, conservation commissions, offices of state forester, to improve their fire laws, to establish forest reserves, to promote schools and associations of forestry.

It is significant to forestry that in the year 1901 the first professionally trained forester became the state forester of Connecticut.

His Message to Foresters

On March 26, 1903, breaking the custom of not speaking in private houses, T. R. met with the members of the Society of American Foresters in the home of Gifford Pinchot, talking of the responsibility of their work and the nation's need of their devotion to it. It was such stimulation that began the crusades against the forest devastation that had for years been free of any control.

His simplicity and orderliness in speaking got his ideas across so forcefully that not only could his words be not forgotten but his summing up of the concepts of forestry and foresters was at once put into action and has ever since influenced the development of the profession. Said he,

> . . . I believe that there is no body of men who have it in their power today to do a greater service to the country than those engaged in the scientific study of, and practical application of, approved methods of forestry for the preservation of the woods of the United States.
>
> . . . The forest policy of any country must be an essential part of its land policy.
>
> . . . You can never afford to forget for one moment what is the object of our forest policy. That object is not to preserve the forests because they are beautiful, though that is good in itself, nor because they are refuges for the wild creatures of the wilderness, though that, too, is good in itself; but the primary object of our forest policy, as of the land policy of the United States, is the making of prosperous homes. . . The whole effort of the government in dealing with the forests must be directed to this end. . .
>
> And you are going to be able to make that policy permanently the policy of the country only in so far as you are able to make the people. . . appreciative of what it means. Impress upon them the full recognition of the value of its policy. . . Keep in mind the fact that in a government such as ours it is out of the question to impose a policy like this from without. The policy . . . can come only from the intelligent conviction of the people themselves. . .
>
> . . . You must convince the people of the truth . . . that the success of home makers depends in the long run upon the wisdom with which the Nation takes care of its forests. . .
>
> You yourselves have got to keep this practical object before your mind; to remember that a forest which contributes nothing to the wealth, progress, or safety of the country is of no interest to the Government and should be of little interest to the forester. Your attention must be directed to the preservation of the forests, not as an end in itself, but as a means of preserving and increasing the prosperity of the nation.
>
> Forestry is the preservation of forests by wise use . . . Keep before your minds that definition. . .
>
> The forest problem is in many ways the most vital internal problem in the United States. . .
>
> The relation between the forests and the whole mineral industry is an extremely intimate one. . .
>
> The very existence of lumbering, of course . . . depends upon the

President Theodore Roosevelt and Chief Forester Gifford Pinchot on the river steamer Mississippi, October 1907. This picture was taken on a trip of the Inland Waterways Commission, designed to awaken interest in the development of inland waterways. More than 20 state governors went along.

Photo U. S. Forest Service

success of our work as a nation putting practical forestry into effective operation.

. . . So it is in only a less degree with transportation, manufactures, commerce. . .

. . . The forest resources . . . are already seriously depleted. They can be renewed and maintained only by the cooperation of the forester with the practical man of business in all types, but above all, with the lumberman. And the most striking and encouraging fact . . . is that lumbermen are realizing that practical lumbering and practical forestry are allies, not enemies. . .

. . . The attitude of the lumbermen toward your work will be the chief factor in the success or failure of your work. . . You must keep your ideals high and yet must seek to realize them in practical ways.

The United States is exhausting its forest supplies far more rapidly than they are being produced. . . There is only one remedy. That remedy is the introduction of practical forestry on a large scale. . .

You have created a new profession of the highest importance, of the highest usefulness to the State, and you are in honor bound to yourselves and the people to make that profession stand as high as any other profession. . . The profession you have adopted is one which touches the Republic on almost every side—political, social, industrial, commercial. . .

. . . I believe that the foresters of the United States will create a more effective system of forestry than we have yet seen.

. . . The members of this society have an unexampled field before them. You have a heavy responsibility. . . You made a good beginning. . . We have reached a point where American foresters trained in American forest schools are attacking American forest problems with success. . . You must instill your own ideals into the mass of your fellowmen and at the same time show your ability to work with them in practical and business fashion.

This inspiring speech was preserved for forestry for all time as the first article in Volume 1, number 1 of the *Proceedings* of the Society of American Foresters. Its concepts and admonitions are aplicable today to young men just adopting forestry as their profession, and still a source of courage and confidence to those already engaged in its work.

Another impetus was the Conference of Governors in the White House May 13-15, 1908, the forest resources and influences being a large part of the proceedings. The President in his address stressed the change in the attitude regarding wise use of forest resources as contrasting to that of the early settlers who used up their forests and moved on to other forest areas.

Rise of Private Forestry

Industrial interests began to see the threat of timber scarcity before 1905. Finch, Pruyn and Company, Inc., in New York State developed plans for forest management on their holdings. However, the struggle begun by President Roosevelt and his small group of foresters to win over the lumbering interests to wise forest management has been a long and hard one. The rewards of those men and the thousands of sincere workers that have followed are evidenced by the extensive programs today in industrial forestry.

A few of the signs of their success are the rapidly growing Tree Farm program with more than 42 million acres of well-managed privately owned forest land, "Forest Tree Nurseries in the United States 1957" showing a list of 190 with a total production of 1,101,471,000, statistics showing private holdings to the amount of 116,000,000 acres in commercial forest land in 1945, organized cooperative protection against fire and pests, statistics showing 7,400 private and industrial foresters employed, advertisements of great lumber companies on the importance of forest renewal under good management, turning of industrial companies to forest research for better management by financing foundations and other research groups, the rapidly increasing number of consulting foresters to warrant the forming of the Association of Consulting Foresters in 1948, election for the first time in 1947 of an industrial forester to the Presidency of the Society of American Foresters, the "Col. William B. Greeley Lectures in Industrial Forestry" sponsored by the Industrial Forestry Association, trained foresters becoming lumber company managers, increased employment of foresters in other industries such as pulp and paper, manufacturing and newspaper companies, establishment of industrial forestry scholarships, fellowships, and awards, increased interest in the economics of forestry, and that 86 percent of the tree planting in 1957 was on private lands.

Growth of Forestry Schools

Teddy's persistent drumming on the importance of trained personnel to manage the forests had its influence on the sudden rise and growth of forestry schools. In the *Yearbook* of the United States Department of Agriculture for 1895 there is no hint of forestry education.

The 1899 *Yearbook* contains two paragraphs on "Instruction in Forestry" in connection with elementary instruction in 32 of the state agricultural colleges and "to some degree" in other institutions in courses in agriculture, horticulture, or botany, mentioning the New York State College of Forestry organized in 1898, and the year's course at Berea College in Kentucky. It gives a sentence to the "steps . . . taken which will result in the opening of a forest school as a department of Yale University in the autumn of 1900."

The 1900 issue enters the subheading "Schools of Forestry" and describes the length of the courses, giving also the names of the directors.

The 1901 *Yearbook* in a small section "Instruction in Forestry" shows the rapid growth in forestry training interest in these three short paragraphs.

> The rapid increase in forestry throughout the country is nowhere more noticeable than in educational circles, and a most gratifying increase in attendance is reported from the forest schools.
>
> At the New York State College of Forestry there are now enrolled 38 students, an increase of 100 percent over the attendance of last year. The Yale Forestry School has 31 students, and at the Biltmore Forestry School the new year has opened with 11 matriculates.

There is a growing tendency on the part of colleges and universities of the country to add courses in forestry to their curricula. Already 47 institutions of learning offer instruction in Forestry, and it is worthy of notice that in several cases high schools are following the lead of the universities.

By 1905 the list had grown to nine schools or departments offering full courses in forestry, two leading to the Master of Forestry degree.

What a great satisfaction it would be to Roosevelt if he could today read the statistics of the three factors in forestry education in which he was so vitally interested—professional standing, forestry schools, and education of the public.

Public Education

The *Conservation Yearbook*, a tribute in itself to the accomplishments of conservation, lists 74 national and 18 regional organizations with active programs in the interests of conservation. The present membership of the American Forestry Association exceeds 25,000, that of the professional Society of American Foresters is 12,000. There are Keep Green programs in 35 states, Tree Farm programs in 36 states.

The growth of forestry schools since Roosevelt's time is indicated in statistics from the schools for 1957 in the February 1958 issue of JOURNAL OF FORESTRY. There are 37 schools of forestry, only 10 of these being nonaccredited. These schools awarded an estimated 1,174 undergraduate degrees, 223 master degrees, and 48 doctor degrees. The total enrollment was 7,395.

The extension of forest information to the general public is fabulous compared to the limited knowledge and interest of that group when T. R. was vigorously trying to get across to those in power the importance of such a program. Colleges, states, schools, small communities, societies, and industrial groups are carrying on extensive programs in adult education in conservation. Conservation, including forest protection and use, has become part of the curricula in many public schools. The comic book has become a popular medium to get basic ideas across.

The celebration of his own centennial stressing conservation is a great contribution to the present-day program of forest extension to the public.

Forestry Literature

The research activity of a profession is reflected in its published literature. Although Roosevelt was himself a prolific writer, his influence on the literature of forestry was by promotion of writing by those with the know-how. Before 1901 forestry literature as such was meager and had appeared mostly as part of a larger group of writings with a growing tendency toward bulletins and magazine articles on specific subjects and problems. His emphasis on the forests and forestry in his fight for conservation of the natural resources started an unprecedented deluge of forestry writing. It is significant that in the three volume report in 1909 of the National Conservation Commission forest resources comprised nearly all of Volume 2, the largest, or 579 of the 1,825 pages in the report.

Between 1887 and 1900 the Bureau of Forestry issued 29 in its Bulletin series, ending in 1913 with 126. The new series beginning in that year grew to 1,500 by 1929 when it was superseded by the United States Department of Agriculture Technical Bulletins. The titles of the early series show the extent of the research being carried on by Roosevelt and his group of trained foresters—"Forest Working Plan for Township 40, History of the Lumber Industry in the State of New York, Conservative Lumbering at Sewanee, Tenn., Forest Resources of Texas, Forests of the Hawaiian Islands, Forest Planting in Western Kansas, Federal and State Forest Laws, Forest Conditions of Northern New Hampshire, Terms Used in Forestry and Logging, Grazing on the Public Lands, Natural Replacement of White Pine . . . Advice for Forest Planters in Oklahoma, Forest Reserves in Idaho, Effect of Moisture upon Strength and Stiffness of Wood, Forest Products of the United States 1905, Wood Preservation in the United States, Protection of Forests from Fire."

The 53 "Silvical Leaflets" issued between 1906 and 1912 made available information on individual species. The "American Woods" series and the current "Silvical Characteristics" series have continued and augmented this service to the profession.

The rapid growth of forestry literature is indicated also by the fact that in 1942 a college forestry library made an estimated count of 12,578 titles in its holdings on technical forestry. Only 1,663 of these were in book form. It is safe to guess that these numbers have now more than doubled. Forestry literature has reached, along with the profession, a place of high respect.

The first experiment station to be established was the Coconino Plateau near Flagstaff, Arizona in 1908. At present there are forest experiment stations covering all regions of the United States, Alaska, and Puerto Rico. All of these are issuing every year hundreds of publications in the form of annual reports, station papers, occasional papers, leaflets, and longer research reports.

The Roosevelt Wild Life Forest Experiment Station established at the New York State College of Forestry in 1919 is another example of his lasting influence on forest research.

A Summing Up

"Teddy" became a household word even as he had made the term "Conservation." Probably more pets and children have been named for him than for any other American. He reached every facet of the nation's life. He loved the North. It was in North Creek Railroad Station on his return from a climb up Mount Marcy in the Adirondacks that the message caught up with him informing him that he had become President of the United States. The East was his home. He was born and began his political career in New York City.

He was the first president to have lived in and to have known the West. Through his mother's family he had knowledge of the South. He understood and dealt quickly with all their problems—political, industrial, commercial, military, and social. Forestry, to him, had a big part in solving all of these.

In summing up the contributions that Theodore Roosevelt made to the profession of forestry no better words could be put together than those used by his closest forester-associate, Gifford Pinchot, in his article "Roosevelt's Part in Forestry" appearing in the February 1919 issue of the JOURNAL OF FORESTRY.

> . . . Some men belong to all people and all time. I suppose it is true that Theodore Roosevelt was loved and trusted by more men and women in more lands during his lifetime than any other man who ever lived . . .
>
> Gifted in the highest degree with the forester's master qualities of hardiness, judgment, self-control, and the power of observation, Roosevelt brought with him to the White House so deep a sympathy with the foresters' viewpoint that it gave color and direction to all he did touching the great central problem of conservation.
>
> There was no forester but would have liked to have him on the hardest of his trips. There was no time when his mind was not alert for the protection and advancement of the forests. . .
>
> Roosevelt's sympathy with forests and his genius for administration made him from the first an active and powerful supporter of the proposal to transfer the National Forests from the General Land Office to the old Bureau of Forestry, and thus to unite the forest work of the Government under a single head . . . the personal pressure which he exerted was by far the strongest factor in our final success . . . It was Roosevelt who made the Forest Service possible.
>
> It tells but little of the story to say that Roosevelt saved for us more National Forests than all other Presidents put together. He not only created but defended and preserved them. . .
>
> It was the endless good fortune of forestry in America that while it was still young it should have had in the White House so firm, sympathetic, and understanding a friend. How much it owes to him it will never be possible to accurately determine; for the debt of forestry to Roosevelt is not to be counted only in the great things he did for it, but also in the thousands of small advances and advantages which came to American forestry because it was known to be dear to the heart of the first citizen, the greatest driving force, and the most powerful influence in America.
>
> Forestry is firmly established among us today because Roosevelt stood behind it like a stone wall when there was little to it except hope and good intentions.

Theodore Roosevelt, affectionately known then and now as T. R. and Teddy was indeed a forester—at heart and trained by his devotion to promote the profession to the high place of respect it holds today.

The profession of forestry can be proud of its accomplishments in the fifty-five years since T. R.'s prophecy that "the foresters of the United States will create a more effective system of forestry than we have yet seen."

It has far exceeded his faith in it by maintaining the policies and aims set by his group, getting them before the public and educating a group of high-ranking professionals to promote them. His influence was surely great and everlasting. A great man. A great national resource. A great profession.

To Issue Forest Conservation Commemorative Postage Stamp

The Post Office Department has announced plans to issue a postage stamp commemorating forest conservation. It will be placed on sale on October 27 with ceremonies held at the opening session of the 83rd annual meeting of the American Forestry Association in Tucson, Ariz. This date marks the 100th anniversary of the birth of President Theodore Roosevelt, who originated the first Governor's Conference on Conservation, and who is generally credited with establishing this country's forest conservation program on a sound basis.

The stamp will feature the overall objective of protection, management, and utilization of forests. Details of design and color will be announced later.

Is Price Reporting for Standing Timber Feasible?

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SENATE BILL 840 was introduced on January 25, 1957 by Senator Hubert Humphrey for himself and five other members of the Senate to provide for "price reporting and research with respect to forest products" (*9*). Although parallel bills had been introduced in the 84th Congress and were also introduced later in the 1st Session of the 85th Congress, this particular bill became the focal point for a growing debate concerning price reporting in forestry. The proposed legislation, if passed, would have authorized and directed the Secretary of Agriculture "to establish a price reporting service for basic forest products, including but not limited to standing timber and cut forest products such as sawlogs and pulpwood." The bill was referred to committee and on April 4, 1957, was adversely reported on by the Department of Agriculture. No final action was taken before the close of the first session of the Congress.

Clearly the issue has not yet been resolved and further action in this direction can be anticipated. Such legislative activity manifests the steadily mounting interest in price reporting for timber and timber products which has also been reflected in professional discussions. For example, Guttenberg (*4*) and Stoddard (*7*) have strongly advocated the establishment of such price reporting, while more recently Shaw[1] (*5*) has argued against such a service and the American Forestry Association has editorially opposed Senator Humphrey's bill (*1*).

As is frequently the case in the arena of public policy formulation, the discussions both pro and con have involved a confusing mixture of two questions which, although interrelated, deserve separate consideration: (1) Is price reporting for standing timber desirable? (2) Is price reporting for standing timber feasible?

The first of these questions involves political and ideological as well as economic and technical criteria, and thus is of general public concern. The second, in contrast, is limited to the area of professional competence of foresters, in which the analysis of the issues involved becomes their particular responsibility.

This paper is intended as a contribution to such a separate analysis of feasibility, free of any implications as to whether or not timber price reporting would be desirable if feasible. The discussion is limited to standing timber, since price reporting for standing timber differs greatly from price reporting for cut products in terms of the issues involved in the question of feasibility. In addition, the discussion is primarily directed to conditions in the western part of the United States.

What Constitutes a "Feasible" Program?

In general, a proposed public program is considered "feasible" only if its stated objective can be attained at a cost which the public is willing to assume. Senate Bill 840 had as its stated objective the establishment of a service designed "to provide farmers and other owners of small forest properties with current information on markets and prices and to aid them in more efficiently and profitably marketing forest products" (*9*). While this particular objective has commonly been stressed, it has also been argued that such price reporting would be helpful to timber buyers and would enable needed economic analyses. For present purposes, then, the objective of price reporting for standing timber can be stated in more general terms as being the development and publishing of price data which are free of bias and sufficiently definite to be useful in making economic decisions concerning specific forest properties. If a program could be devised which would provide such data at a reasonable cost, that program would be a "feasible" one.

Initially this discussion will ignore cost consideration and center on other problems involved in providing the desired data. Simply in terms of the kind of data required, a price reporting program must satisfy at least two major criteria:

1. There must be a low variance of prices around the mean price reported for any given commodity. Unless this range of variation around the reported price is narrow, any attempt to apply the data in making decisions for specific properties may be badly misleading. This problem is particularly acute for standing timber, and much of the following discussion is devoted to it.

2. The reported prices must be based either on complete enumeration or on a sampling method which will provide relatively precise and unbiased estimates of average price. This appears self-evident, but the problems involved merit later discussion.

Commodity Classes for Standing Timber

Stands of timber are aggregations of particular numbers, species, sizes, and qualities of trees growing under specific topographic, soil, and climatic conditions and having unique locations relative to

[1]Also published as Shaw, A. C. Price reporting of forest products—an approach to a controlled economy. Proceedings, Society of American Foresters Meeting, Syracuse, N. Y. 1957, pp. 89-91.

roads, mills, and market centers. A heterogeneity of standing timber prices is an inevitable and appropriate economic expression of this heterogeneity of characteristics. In order to reduce the variation in prices around the mean price to acceptable levels, it is necessary to reduce the heterogeneity by determining prices for particular commodity classes of standing timber which tend to be uniform in price-determining characteristics.

This problem of establishing commodity classes for price reporting is not peculiar to standing timber, but it takes a form not ordinarily encountered in agricultural price reporting. For example, the grain crop is also extremely heterogeneous, and an average price for the entire category, or even for each species in the category, would have little utility. However, in this case a further classification serving to reduce price variability around the reported average prices is based on easily identifiable factors such as variety and quality grades. This is readily accomplished by making use of the grading system which is an established part of the marketing structure. In contrast, the market has not established any recognized and comprehensive system of classification for standing timber and the problem remains to be solved in the development of a feasible price reporting program.

As is true of all commodities, the price of standing timber depends upon the aggregate supply and aggregate demand for timber of particular species and qualities and, in the case of individual sales, upon the relative knowledge and strength of buyer and seller. In addition, within any given general market situation the price of timber on a particular tract will be affected by the costs of development, logging, milling, and transportation as well as by the acceptable profit margin pertaining to the circumstances of that tract. Thus the price-determining commodity characteristics include not only species composition and tree or log grades, but also such factors as accessibility, type of logging chance, stand density, required road construction, and efficiency of logging and milling processes. Any satisfactory price reporting system must involve a selection of pertinent characteristics of this kind as a first step in defining relatively uniform commodity classes within the category of "standing timber." (A related problem of classifying the prices themselves in terms of methods of estimating or scaling, volume, period of payment, responsibility for taxes, and similar characteristics will be noted later.)

In developing the commodity classification system, two types of problems must be faced concerning the factors tentatively selected for use in the classification: (1) How are these factors related to price? Is the apparent relationship significant? (2) Are sufficient factors included or have important factors been omitted?

Regression analysis provides an appropriate starting point in studying these problems. The regression coefficients serve as statistical indicators of the apparent relationships of the factors to price, while tests of significance show whether or not the relationship has been demonstrated at a satisfactory level of probability. The coefficient of determination, which measures the proportion of the total variance associated with the factors tested, indicates the adequacy of the factors tested in "explaining" the observed variation in prices.

Previous Analyses

Four previous studies (*2, 3, 6, 12*) of the determinants of timber prices which have employed regression analysis are summarized in Table 1. Both the study of Cruikshank and Anderson (*2*) and that of Guttenberg (*3*) were intended to develop data which would be useful in the establishment of a price reporting system. It is on the basis of these analyses that Guttenberg has stated that "recent studies have shown that it is possible not only to identify the price determinants in a given area but also to evaluate the degree of their influence" (*4*).

It is important to note that three of these four studies (with Steer's work being the exception) are based on data extending over a period of time. From the standpoint of evaluating the possible effectiveness of a particular commodity classification system, this is unfortunate. Determination of the adequacy of particular factors in explaining price variation in a given market is confounded by the presence of relationships which are effective over time. Thus regression analysis of prices over a period of time can provide answers to the questions of the relationship of the factors to the prices, but it cannot provide any indication as to whether or not sufficient factors have been included or important factors omitted.

In this connection it must be recognized that total price variation over time is a composite of the effects of: (1) Variability in the commodity itself; (2) Differing market structures; (3) Changes in supply and demand over time.

To define uniform timber commodity classes that will remain stable during shifts in supply or demand, only factors of the first kind are relevant, assuming a given market structure.

In other words, analysis over time can indicate what percent of the total variance is explained by all the factors included in the analysis, but cannot show what part of the variation due to the commodity itself is explained by those timber characteristics included in the analysis. Explanation of total price variability over time by factors such as "lumber price" or "value of residential building in year of sale" is of interest, but it is not pertinent to the question of the feasibility of price reporting. Variation due to differing market structure or to changes in supply or demand over time must be eliminated by the selection of data representing a given market structure and a given point in time before regression analysis can provide a test of the effectiveness of a possible commodity classification. Unfortunately, there appears to be a shortage of such "cross-sectional" price data for standing timber.

TABLE 1.—PREVIOUS STUDIES OF STUMPAGE PRICE DETERMINANTS

Author	Steer (*6*)	Wilson (*12*)	Cruikshank and Anderson (*2*)	Guttenberg (*3*)[1]
Type of sale	"Stumpage"—private sales in western Washington	Sugar pine—Stanislaus and Eldorado N.F., Calif.	Pine sawtimber—marked private sales in South Carolina	Pine sawtimber—national forest sales in Miss., La., and Tex.
Period of sales	1929	Jan. 1943 - Dec. 1951	1948 - 1954	July 1953 - March 1955
Number of sales	123	55	382	91
Factors tested	1. Log haul in miles 2. Area of the sale 3. Density of stand in board feet per acre 4. Percentage of inferior species	1. Volume of sugar pine on sale 2. Volume of inferior species 3. Volume of ponderosa pine on sale 4. Area of sale 5. Value of residential building in California in year of sale 6. Log haul in truck miles 7. Lumber haul in truck miles 8. Number of years allowed to complete cut	1. Average volume per tree 2. Average volume per tree 3. Total volume 4. Area of sale	1. Sale volume 2. Pine cut per acre 3. Hardwood ratio 4. Number of bids 5. Average volume per tree 6. Tree volume per unit basal area 7. Wholesale lumber price for month prior to sale 8. Wholesale lumber price two months prior to sal
Significant factors	No tests of significance	5 and 7	1 and 2	1, 2, 3, 4, 6, and 7
Coefficient of determination	.16	.61	Zone 1 — .31 Zone 2 — .23 Zone 3 — .16	.47

[1]Second part of study, based on results of earlier analysis, referred to here.

Of the four studies summarized in Table 1, only the work of Steer was based on cross-sectional data. It must be added that, on the basis of the study indicated in Table 1 and nine supplemental studies, Steer came to the essentially negative conclusion that "stumpage prices are not influenced by physical conditions, such as the accessibility, the density, the composition of the timber, and the size of the area sold, to as great an extent as they are by economic and other conditions and factors which cannot be statistically measured" (*6*).

National Forest Timber Sales in California

In view of these observations, it seemed appropriate to initiate a further study using cross-sectional data rather than data extending over a period of years. In California, the quarterly summaries of U. S. Forest Service timber sales (*11*) represent the most complete price information available for any one ownership type. In fact, these summaries can be considered as an established price reporting system for national forest timber. The tabulated details of the sale descriptions included in the reports are presumably selected as pertinent indicators of the nature of the transactions.

The use of price data from a single public agency eliminates the sources of heterogeneity in prices resulting from variations in sellers' practices. All the Forest Service sales considered represent the prices obtained by an informed seller under no compulsion to sell and involve the use of a standard, highly detailed printed contract, a specified standard scaling procedure, standardized terms of payment, and standardized conditions as to various responsibilities and liabilities. This is in sharp contrast with conditions encountered in the private sector. Here the basis of sale ranges from a complete absence of volume determination in "lump sum" sales through such crudities as "buyer's cruise" to log scaling and mill tally bases. Within scaled sales, differences in log rules lead to such well recognized differences in olume that Cruikshank and Anderson (*2*) found it necessary to publish three separate price tables corresponding to the three log rules used.

More subtle but equally important differences result from the great ariation to be found in scaling practices. Current studies in Mendocino County, California indicate that the use of "long log" rather than "short log" practices in applying the Scribner Rule can decrease the volume by amounts ranging up to 30 percent for individual logs. Moreover, changes in the attitude of the scaler toward defect deductions can result in substantial changes in net scale which in reality represent an indirect price adjustment to changing market conditions.

To these must be added the widest variations in types of verbal and written contracts, length of cutting rights, terms of payment, responsibility for taxes, liability for losses, and all other factors related to the full description of the price. It seems evident, therefore, that the development of commodity classes for private sales of standing timber will involve numerous sources of price variation in addition to those encountered on public sales; it is thus a more complex problem.

In view of this uniformity of market structure on the seller's side and consistency in basis of price quotations, the Forest Service data should represent a comparatively favorable situation for the development of commodity

classes for timber. The problem to be solved is that of developing commodity classes that will serve to reduce the variance around the mean price to a level such that the resulting reported prices can be used as a direct guide to economic decisions on specific properties. In its simplest form, the question can be asked, "Can a classification system be developed which will reduce the variation around the average price for each class to such a degree that these average prices can serve as a guide to price in other public timber sales?"

The analysis was based on ponderosa pine prices reported for national forest timber sales in California in 1956. Of the 108 sale descriptions published in that year, 4 were of sales which received no bids, 27 were of salvage sales, 9 did not include volume figures for ponderosa pine, and 3 varied from the general pattern of descriptions by giving log haul in railroad miles instead of truck miles. The analysis was limited to the remaining 65 sales.

The unweighted average price of ponderosa pine in these 65 sales was $30.68 per thousand board feet and the standard deviation was $10.54, giving a coefficient of variation of 34.3 percent. Although definitive data on this point could not be obtained, the information available to the writers indicates that this is a much higher coefficient of variation than is ordinarily found in agricultural price reporting. The distribution of prices was approximately normal, with 41 of the 65 reported prices falling within the range $20.14 to $41.22 and 62 of the prices falling within the range $9.60 to $51.76. In effect, one could look at any proposed national forest timber sale in California in 1956 and say: "There are about two chances out of three that the price of ponderosa pine on this sale will fall between $20 and $41." It seems obvious that price variation of this degree must be sharply reduced before any such price reporting would be very helpful to either seller or buyer.

Multiple regression techniques were used to analyze the relationships between these ponderosa pine stumpage prices and five factors either given directly in the sales descriptions or easily derived from them. The five independent variables used were volume of ponderosa pine included in the sale, percent of total volume in ponderosa pine, volume of timber per acre of sale area, log haul in truck miles, and lumber haul in truck miles.

The results of this statistical analysis are summarized in Table 2. At the 5 percent probability level, only the length of lumber haul in truck miles was found to be significantly related to price. The only *a priori* explanation that can be suggested for this somewhat surprising relationship is based on the assumption that conditions surrounding lumber hauling are fairly uniform in the state, leading toward uniform costs per mile in lumber hauling. In contrast, log hauling is more affected by conditions peculiar to individual operations, leading to much greater variation. Much the same may be true of the other variables tested, with the result that they are less closely related to price than length of lumber haul. Nevertheless, this relationship between price and lumber haul might be dismissed as simply a statistically produced aberration if the same variable had not been found to be the only timber commodity characteristic associated with sugar pine stumpage prices in Wilson's study in 1953 (*12*). In any case, the multiple coefficient of determination of .26 indicates that use of the five factors tested in the development of commodity classes would have little effect in reducing heterogeneity of prices for a price reporting system.

A further analysis was made in which the sales were divided into competitive and non-competitive groups. Competitive sales were arbitrarily defined as those in which the difference between appraised and bid price was greater than 25 cents per thousand board feet. Under this definition there were 30 non-competitive sales and 35 competitive. Regression analysis of prices in each of these two groups was carried out separately, using as independent variables the total volume of the sale, the percent of total volume in ponderosa pine and sugar pine, the volume of timber per acre of sale area, log haul in truck miles, and lumber haul in truck miles.

The results of these analyses are also summarized in Table 2. In the case of the competitive sales, once again only the length of lumber haul was found to have a significant relationship to price at the 5 percent level. The multiple coefficient of determination was a discouragingly low 0.19. The analysis of the non-competitive sales indicated no significant relationship of price with any of the variables tested.

Although the factors tested are prominent among those usually mentioned as affecting stumpage prices, it is conceivable that factors could be found which would collectively be much more effective as a means of reducing variability in price reports. The appraised costs of road construction and other developmental work and the distribution of volume by log grades are examples of other fac-

TABLE 2.—ANALYSIS OF PONDEROSA PINE STUMPAGE PRICES FROM NATIONAL FOREST TIMBER IN CALIFORNIA DURING 1956

	All sales	Competitive sales	Non-competitive sales
Number of sales	65	35	30
Mean price (unweighted)	$30.68	$36.10	$24.35
Standard deviation	$10.54	$ 9.18	$ 8.24
Coefficient of variation	.344	—.254	.338
Significant factor	Lumber haul	Lumber haul	None
Regression coefficient	—.085	—.234	—
Coefficient of determination (adj.)	.259	.191	—

tors which might be tested for association with price. However, data concerning these factors are not now readily available, and their collection and quantitative expression appear to involve more difficulties than is the case for the published factors.

This analysis indicates that even the relatively full information published in the national forest sales summaries for California does not provide an adequate basis for a commodity classification in which the classes would have substantially less variation around their average prices than is encountered around the simple average of all the sales prices for a given species. More generally, analysis of this comparatively simple case has failed to produce a promising approach to the more complex problem of commodity classification involved in private sales of standing timber.

It may well be that the difficulties which appear to be involved are at least in part peculiar to the western part of the United States. Basically, any sale of standing timber involves certain factors which are unique to the stand and others which are common to many sales. In much of the West, with its mountainous terrain, a wide range of tree sizes and qualities, and complex stand structures, the unique characteristics appear to rank high relative to the common characteristics. Thus heterogeneity of prices is large and not easily reduced. In other regions of the United States with simpler topography and more uniform conditions, price heterogeneity should tend to be less and might be more susceptible to reduction through commodity classification.

The Question of Precision and Freedom from Bias

Assuming that the problem of defining satisfactory commodity classes with reduced price variability were to be solved, the further problems associated with obtaining desirable estimates of average prices for those classes would remain. This involves the properties of statistical precision and freedom from bias mentioned earlier as the second of two major criteria which data for a feasible price reporting system must meet. In this connection it is worth considering some of the proposed reporting sources, particularly with respect to the question of bias. This problem involves the possibility that an unintended selectivity of sources in sampling may result in a failure of the sample to be representative of the designated population. Other non-compensating errors in data collection may also contribute to bias.

As a basis for its parity calculations, the U. S. Department of Agriculture assembles both monthly and annual statistics on "prices received by farmers." In this program the overwhelming majority of reporters is composed of farm product buyers who provide their services on a voluntary basis. They are sent mail questionnaires which request their estimates of the "average" prices which they believe to prevail in their localities, not specific transaction prices. A similar voluntary reporting system has been suggested, and actually employed to a limited extent, for forest products, although here actual transaction prices have more commonly been requested. Such a sample must necessarily be of a selective nature. In addition, if it is recognized that buyers are being asked to report prices for a purpose which they might well consider as contrary to their immediate interests, the possibility of substantial bias is apparent. Todd and Zirkle (*8*) indicate a further problem in that prices reported by buyers may be consistently in excess of actual sale prices in cases where payments are based on rough estimates of total volume and these estimates run lower than the actual cut.

Sellers of stumpage, or some combination of sellers and buyers, might be proposed as alternative reporters. However, the same factors which have prevented the Department of Agriculture from using farmers as a primary reporting source are present here. In general, the seller is involved in sales only infrequently and is not well-informed concerning prices of other sales. Unless compulsory reports were to be required of all sellers at time of sale, representative sellers' reports could not be expected for all price populations involved. It must also be remembered that sellers are not always eager for full disclosure of prices, particularly when they hold substantial remaining timber subject to assessment for property taxation.

Foresters who are engaged in marking timber have sometimes been suggested as the best source of transaction data. Guttenberg suggests that "by collecting very little more data than is already required of them, these foresters could provide the material for a price-reporting service" (*4*). Since Cruikshank and Anderson (*2*) found less than one-sixth of approximately 1,500 service forester reports on South Carolina sales made between 1948 and 1954 to be usable in their study, it appears that even this source may involve some reporting problems.

In any case, such a basis for price reporting is highly selective. Although it might be entirely appropriate to report average prices for specific price populations, such as prices for private timber marked by service foresters who submit complete reports, it would be necessary to identify these prices as pertaining only to that specific population and not to any wider price population. In this regard it should also be noted that timber stands selected on any such single basis may also differ from the balance of stands in other important attributes. Certainly if price reporting is to be based on selected populations it would seem desirable to cover a fairly wide range of such populations.

One reporting source not yet considered would be that of reporters employed by a price reporting service, as in the case of the Federal Market News Services under the Department of Agriculture. These price reports, designed to provide the latest market information, are the reports to which

reference is made in statements about the possibilities of hearing morning broadcasts of timber prices along with those of cotton, tobacco, and other agricultural commodities. The operation of this service is predicated on the existence of established market centers at which the market reporters can obtain prices and other market information by visiting those engaged in buying and selling during the normal time of trading or immediately thereafter. The difficulties in applying such a procedure to the marketing of standing timber are too obvious to deserve comment.

Beyond the problem of reporting sources and bias, there is that of achieving a sample large enough to provide relatively precise estimates while still keeping the price information current. Even in the South where the variability in stumpage prices is considered to be relatively low, Cruikshank and Anderson concluded that "it would be difficult to issue an average price, based on field reports, more frequently than once a year" (*2*), although they suggest some methods of overcoming this difficulty such as enlarging the geographical zones used. If any form of voluntary reporting were to be adopted, the problem of maintaining lists and promoting response would be a major one. It is not unusual for response to be well under 50 percent in present farm price reporting. Such poor response not only affects the size of the sample and precision of the estimate, but also compounds the problem of selectivity and the resulting bias.

Complete enumeration or probability sampling of all timber sale prices by the price reporting service would minimize bias and would permit the variance of estimates to be measured, but such methods generally have been considered to be of prohibitive cost in the case of other commodities. For example, it is stated in a Department of Agriculture publication that "application of enumerative and probability sampling methods to price data for farm commodities has been limited, mostly because of lack of funds" (*10*). It is through considerations such as these that the cost element in the definition of "feasibility" suggested earlier plays its compelling role.

Conclusion

Is price reporting for standing timber feasible? No conclusive evidence has yet been given that measurable characteristics of the timber commodity itself can be used as a basis for obtaining the needed reduction in the great variability of timber prices which exists even for particular species, areas, and markets. The analysis presented here for the relatively simple case of national forest sales in California has failed to reveal any usable relationship between ponderosa pine prices and such factors as volume of timber, proportion of pine, density of cut, and length of log haul. In work on timber price reporting to date, problems of bias due to selectivity in reporting sources and difficulties of maintaining precision in estimates through adequate sample size have received only incidental consideration. These issues involve not only unresolved questions as to procedures but also are directly related to the probable cost of such a service. No estimates of the cost of a standing timber price reporting service have been made that would permit the public to weigh the presumed results of such an expenditure against those possible from alternative uses of the same funds. In short, it has yet to be demonstrated that price reporting is feasible.

However, no final verdict, either pro or con, can be reached without additional factual information and objective analysis. An excess of pessimism is as unjustifiable as undue optimism, and is far more harmful if it hampers aggressive research in areas fundamental to the problem. The question of the feasibility of price reporting for standing timber serves to underline the primitive state of knowledge concerning the actual price-determining mechanism involved. Further debate on this issue may well be the stimulus needed to transform speculation into its more productive counterpart, investigation.

Literature Cited

1. ANONYMOUS. 1957. Will price reporting work? Amer. Forests 63 (3): 9.
2. CRUIKSHANK, J. W., and W. C. ANDERSON. 1955. Pine sawtimber stumpage prices in South Carolina, 1948-1954. U. S. Forest Serv., Southeastern Forest Expt. Sta. Paper 57, 14 pp.
3. GUTTENBERG, S. 1956. Influence of timber characteristics upon stumpage prices. U. S. Forest Serv., Southern Forest Expt. Sta. Occas. Paper 146.
4. ————. 1956. Stumpage price reports as a stimulus to timber growing. Proc. Soc. Amer. Foresters Meeting, Memphis, Tenn., pp. 132-133.
5. SHAW, A. C. 1958. An approach to a controlled economy. Amer. Forests 64(1): 22, 23, 50-54.
6. STEER, H. B. 1938. Stumpage prices of privately owned timber in the United States. U. S. Dept. of Agriculture Tech. Bull. 626, pp. 14-17.
7. STODDARD, C. H. 1956. Some statistical needs in forest economics. Jour. Forestry 54: 841-842.
8. TODD, A. S. JR., and J. J. ZIRKLE, JR. 1952. A test of survey methods for estimating stumpage prices. Agr. Econ. Res. 4: 115-125.
9. U. S. CONGRESS. Senate. 1957. A bill providing for price reporting and research with respect to forest products. 85th Cong., 1st session. Senate bill 840.
10. U. S. DEPARTMENT OF AGRICULTURE. 1949. The agricultural estimating and reporting services of the United States Department of Agriculture. U. S. Dept. Agri. Misc. Pub. 703, pp. 115-124.
11. U. S. FOREST SERVICE. California region. 1956-57. Sales of timber involving more than $2,000; April 5, 1956—Jan. 5, 1957. San Francisco, Calif.
12. WILSON, D. A. 1953. An analysis of sugar pine stumpage prices on the Stanislaus and Eldorado national forests; 1943-1951. Unpublished seminar paper at School of Forestry, Univ. of Calif.

Forest Fire Research Needs in the South

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FOUR OUT OF every five burned forest acres in the United States are in the South. These fires reduce forest yields, and their control requires manpower and money that could be put to more productive uses. This paper discusses forest fire probems with the purpose of pointing out what research is needed to help reduce these losses. It includes both the broad problems of the place of fire protection and fire use in forest land management and the more specialized problems of fire prevention and control.

The South has 193 million acres of commercial forest land, 39 percent of the total in the United States. The value of southern forest products in 1954 was 4.6 billion dollars. The South produces 47 percent of the timber cut in the United States, but could produce much more if past forest fires had not contributed to the prevailing low stocking.

About 42 percent of the commercial forest is pine, 11 percent is oak-pine, 28 percent is upland hardwood, and 19 percent is bottomland hardwood. Farmers own 47 percent of the forest, wood-using industries 17 percent, and other private owners 27 percent. About 5 percent is national forest and 3 percent is in other public ownership. The greatest part of the land is protected by state organizations, augmented by private efforts.

The climate, which is favorable for rapid tree growth in most of the South, also makes fires possible the year around. The major fire season in pine types is late winter and in hardwoods late fall and early spring. However, summer fires usually are more damaging acre for acre than those in the cooler months.

Although southern pine forests are remarkably fire resistant, none can be managed for maximum productivity with indiscriminate uncontrolled fires. Fires kill seedlings and start decay and insect attacks in larger trees. Hardwoods are particularly susceptible to fire wounding and up to 90 percent of the cull due to decay may have started in these wounds. If all the litter and ground cover is not removed by fire there may be little soil loss even in easily erodable mountains, but severe fires, growing season fires, or repeated light fires may start serious erosion. Despite the fire resistance of southern pine forests, recent drought years have seen single fires burning thousands and even hundreds of thousands of acres.

About 98 percent of the fires in the South are started by human beings, acting intentionally or otherwise. Of the man-caused fires 44 percent are incendiary and 21 percent are attributed to debris burning. Organized fire protection, which started in some southern states as early as 1915, has greatly reduced area burned but has not had much effect on number of fires. In 1931, only one-fourth of the forest land of the South had organized fire protection, in 1942 one-half was protected, and in 1955, 85 percent was protected. Burned area in the period 1926-30 averaged 38 million acres per year, whereas 8 million burned in 1951-55. In 1954, direct damage to timber was $34 million and losses to the region's economy $230 million. The $20 million spent annually on fire prevention and control in the South gives some protection to 170 million acres, but on one-fourth of this area protection is adequate only in easy years. This clearly indicates the need for more fire dollars and for more effective ways of accomplishing the protection job. Research can help provide more effective methods.

Although southern forests cannot produce their maximum yields if burned by wildfire, foresters use fire in managing pine stands. One of the major uses has been to reduce hazardous fuels, particularly those that accumulate under dense young pine stands. In the regeneration of longleaf pine, fire is used to prepare seedbeds and sites for planting, to reduce competition and to control the brown-spot needle blight. In other pine types the silvicultural use is primarily to reduce the hardwood understory and secondarily to prepare seedbeds. All these things can be done better on a small scale by machines, hand tools, or chemicals, but at a higher cost. Considering the magnitude of the job, it seems certain that the use of fire in the management of southern pines will not only continue but expand.

Basic Studies of Ignition and Combustion

Forest fire research in the past has pretty largely depended on trial-and-error methods. Although there have been many useful results, the most fruitful approach to the more complex problems is through basic research. Any well-rounded fire research program for the South should provide for facilities where basic ignition and combustion processes and related subjects can be studied under controlled laboratory conditions. These studies will identify signifi-

cant variables and develop scaling laws that will lead to more precise and effective field studies.

Research projects that should prove highly productive include (1) how volume, arrangement, and composition of fuels influence rate of ignition and combustion, (2) how surface fuel moisture and relative humidity affect the probability of ignition from firebrands, (3) how different fuels respond in moisture content to changes in specific weather elements, and (4) how combustion is affected by differences in the controlling variables.

Important Fuel Characteristics

Basic studies of combustion will lead to better understanding of fuels. But research can be aimed directly at the characteristics of fuels that make control of forest fires difficult, that result in varying rates of spread, and that contribute to fire damage. There are obvious differences in the appearance of the fuels and in fire behavior in open grassy areas, in dense pine stands, in hardwood forests, and in areas with logging slash. These differences need to be studied with the aim of producing fuel type classifications that will help fire control men to anticipate burning behavior and control problems of fires in each fuel as weather conditions vary. This information would make possible the transfer of fire control knowledge and experience from one locality to another.

The fuel characteristics that need to be studied include the size, shape, amount, compactness, arrangement, and vertical distribution of individual pieces of fuel. The rate of accumulation of fuels depends on the growth of trees and other plants, the timing of leaf fall, twig and cone shedding, bark sloughing, and also on the rate of decay of this vegetative debris both before and after it reaches the ground. Although infinite combinations of fuels seem possible, research should be able to bring order out of this complexity and provide usable classifications.

Weather and Fire Behavior

From a fire control standpoint, research on weather conditions that breed blowup fires is by far the most pressing. Although such fires make up only a small percent of the total number, they burn most of the acreage. This happens because long-distance spotting and extreme rate of energy release make them almost uncontrollable until they reach natural barriers or until weather conditions improve sufficiently so that direct attack is possible. There is good evidence that when velocity of winds near the surface is greater than velocity of winds aloft, and there is an abundance of dry fuel, the stage is set for blowup fires. Therefore, extension of the basic work already done on thermodynamic and other physical laws that bring about the transformation of heat energy into the energy of motion during blowup fires appears to be the most reasonable approach to the problem. Meteorological research of a high order, leading to prediction of weather factors producing these adverse wind patterns, is also extremely urgent.

During ordinary or even moderately severe burning conditions, the experienced fire control man can anticipate fire behavior fairly well if the weather remains stable. A sudden change in the weather, such as in wind direction, velocity, or steadiness, greatly multiplies the difficulty of suppression. When such changes are likely, accurate predictions by the fire weather forecaster are invaluable.

Fire Danger Measurement and Its Application

At present more than 500 fire danger stations are operated in the South by state, federal, and industrial fire control organizations. The type 8-100 (O or W) danger meter, now widely used throughout the South, integrates fairly accurately the factors that influence the start and spread of fire. However, it does not and was not intended to measure the relative dryness of deep fuels during periods of extended drought. For that reason a Drought Index should be developed that can be used as a supplement to the meter.

Fire control organizations cannot obtain full value from danger measurements unless stations are located and operated according to acceptable technical standards. Only a few organizations are doing well in this respect. As a first action, each agency should set up a program of training and inspection that will insure accurate records. When this is accomplished, danger measurements can be used in the following ways.

Day-to-day determination of the Build-up and Burning Index, when related to past experience, is a reliable indicator of burning conditions and therefore of potential job load. If reliable and localized fire weather forecasts are available, tomorrow's potential load can be anticipated and action taken accordingly.

Danger measurements have been put to other important uses, such as guiding administrators in the issuing of burning permits, warning the public of critical conditions by radio or other means, manning fire towers and other facilities, determining initial attack standards, general organization planning, and desirability of woods closure.

Good records for several years can be used to measure the effectiveness of fire prevention efforts. Year-to-year comparisons solely of number of fires are of little value because more fires this year may simply be the result of more difficult weather than last year. But by calculating the number of fires per thousand units of Burning Index by month, season, or year, for counties, districts, or other subdivisions as desired, the impact of prevention measures can be judged more effectively than at present.

It should be emphasized that a danger meter is not a substitute, but rather an aid to good judgment. Neither will it give satisfactory results unless accurate measurements are made at properly located stations. Responsibility

both for accuracy and apt interpretation lies with the using agency.

Rate-of-spread computers, resistance-to-control indicators, and dispatching guides can also be developed. A rate-of-spread computer combines the weather measurements, used in danger rating, with fuel descriptions to predict how fast fires will spread. A dispatcher's guide combines danger rating, rate-of-spread index, fuel class, resistance-to-control estimates, transportation plans, and other factors into fire crew requirements.

Fire Prevention

Ninety-eight percent of all fires in the South are man-caused and presumably preventable. Since this is so, many methods of persuasion, education, and law enforcement have been tried on the public. But because most prevention programs in the past have been a combination of these methods it has been difficult or impossible to determine the effectiveness of any specific measure.

Fire prevention specialists agree that efforts cannot be best directed unless the causes of fires can be established with fair accuracy. Most fire control agencies are therefore attempting to improve their methods of reporting. However, setting up a list of detailed causes for reporting purposes will not by itself improve the accuracy of information. Improvement will be obtained in direct proportion to the amount of time that investigators can spend in ferreting out causes of individual fires. This is a matter for administrative decision and action.

To determine the so-called "cause behind the cause," study of human relations is needed. Although these basic motives are often discussed, it is possible that better understanding of them will be gained through the help of psychologists and sociologists. By studies of local problem areas they may help pinpoint both the motives of fire starters and the most effective prevention methods. They can also develop study methods, sampling techniques, and ways of evaluating information which can be applied to the many small problem areas throughout the South. It is recognized that fire control agencies can and have cured hot spots; better understanding of human relations may make this job more efficient and less costly.

The use of danger measurements in removing the effect of weather from records of fire occurrence has been mentioned. This has been effective in areas where most fires are accidental but needs further testing in areas with high incendiarism. Combining results of weather and human relations studies, it should be possible to test specific prevention measures in hot spots, and to extend the best methods to areas with similar occurrence patterns. Today, many control agencies believe that the best balance between law enforcement and education emphasizes the former in incendiary areas and the latter in areas where most fires are accidental, but that both are needed for an effective prevention program in any area. Studies that measure the effectiveness of pin-pointed programs in local problem areas should reveal the best combinations.

Suppression Techniques

Over most of the South, average and moderately severe fires are usually controlled fairly quickly with plow and tractor units. Even so, improvement in machines is needed to obtain maximum speed and maneuverability consistent with cost and general utility in different fuels. An equipment development and testing center supported by cooperating agencies would go far toward developing better equipment and eliminating some present duplication of effort.

Development of better plows, transports, or tankers, however desirable, is not the sole need. There is much yet to be learned about the control of fast-spreading surface fires that outrun plow units. The possibilities of mass ignition, backfiring at particular times or from specially prepared lines, and the greater use of tankers, have not been sufficiently explored. Dispersal of fire retarding chemicals by aircraft appears promising, and effective and safe methods for keeping fires small by fast attack, and for reducing the rate of fast-spreading surface fires by this means undoubtedly will be developed. Because the use of aircraft and chemicals in large quantities is costly, the expense is likely to preclude their wide application except during periods of high danger. This high cost emphasizes the need for accurate knowledge of critical conditions.

Undoubtedly, the most difficult of all problems facing fire control organizations is the blowup fire. The probability of suppressing such a fire, with its unbelievable rate of energy output once it is fully developed, does not appear promising. But the situation is not hopeless. If we can foresee highly critical burning conditions so as to alert all possible forces, fast attack on all fires that originate during such conditions should reduce the probability that a fast-spreading fire will reach blowup proportions.

Deep-burning ground fires present a difficult but different problem. During drought they may burn until extinguished by a rise in the water table. Several control methods have been suggested, such as blasting pits to obtain a large supply of water that can be delivered by high capacity pumps, the use of special vehicles for use in boggy areas, regulating the height of the water table, and the use of wetting agents and other chemicals. All these need to be investigated.

Direct and Indirect Fire Effects

Forest fires affect trees and other vegetation, animals, and the soil. Knowledge of all effects is needed to guide the management of southern forests, whether

it be to plan efficient fire control, to mark burned areas for salvage, or to plan effective use of fire.

The direct effects of fire are usually limited to the burning and scorching of living and dead plant material. One approach to studies of direct effects is the collection of records of average mortality and growth loss under various weather and stand conditions. This will give actuarial basis for improved fire damage appraisal, for forest fire insurance, and for economic analysis of fire control costs.

Another approach is to make laboratory studies of the lethal temperature-time relations of leaves, buds and stem cambium, the insulating properties of bark, and the physiological processes involved in the death of plant tissue. These studies will lead to better understanding of the effect of fire on trees and shrubs, and give answers to many present perplexing questions about use of fire and management of forests burned by wildfires.

Fire indirectly affects livestock, game, insects, soil, and watersheds. Most of the effects of surface fires on animals come from changes in their habitat. Reduction or removal of the ground cover can cause accelerated erosion, impaired infiltration, increased surface runoff, and reduced quality of water yields. All these indirect effects of fire are of major interest to those studying forest management, grazing, wildlife, soils, and watersheds. Fire research should cooperate in these studies to help provide accurate measurement of fire behavior and intensity and of the effect of fire on vegetation, and also to help develop the information about these indirect effects that is needed in the complete evaluation of fire control costs, damage appraisal, and fire insurance.

Techniques of Fire Use

Because fire is one of the least expensive tools in the forester's kit for treating large areas, a great deal of practical experience in fire use has been gained. It is estimated that about a half million acres per year are prescribed-burned in southern pine forests. On thousands of other acres fire is used with some attempt to confine it to a preselected area, but without adequate selection of burning conditions or stand conditions.

Even where fires are carefully planned, there may be some hot-spots and some areas that burn too lightly or not at all. Studies of fire intensity and behavior in various fuels and forest stands and under changing weather will lead to more efficient techniques of handling fire. Detailed specifications of conditions which will result in desirable fire intensities, as well as knowledge of the optimum intensities required for specific purposes, can be developed by research.

Fire Control Planning

As progress is made on the foregoing projects, as more is learned about weather, fuels, effects, prevention, and suppression techniques, and the many other elements that enter into fire control, more basic facts will accumulate with which to plan more effectively. We will then be better able to weigh alternatives, to set up fire control objectives, to decide what type of fire control organization will best meet the objectives, to direct an organization most effectively, and to measure costs against returns.

Only a few of the more obvious questions relating to planning and administration are mentioned here. For example, (1) what is the best distribution of funds among prevention, presuppression, and suppression activities; (2) what funds are needed to produce a really effective organization; (3) is the equipment now in use based on unbiased tests; (4) what is the relative effectiveness and economy of fixed versus moving detectors; (5) is the present unit organization so independent that the whole lacks flexibility to meet disaster conditions; (6) is the communication system adequate to meet emergencies; (7) what effects do harvest cuts, timber stand improvement, planting, grazing, game management, and other land management activities have on present and future fire control plans and costs; (8) how can burning for fuel reduction reduce fire control costs and fire losses, and how do these burns affect other forest management plans; (9) how much can we afford to pay for fire control—even though this is largely an academic question.

None of these questions can be answered with finality, but in each fire control organization there should be one or more men who have the skill, responsibility, and authority for seeking out strengths and weaknesses. They should be expected to keep abreast of advances made by other agencies, to apply research findings, and above all to analyze and reanalyze the constantly changing fire situation.

Getting the Fire Research Job Done

No evaluation is given in this paper to the amount of fire research now under way in the South. In 1955 less than $50,000 was spent on full-time fire research. No adequate inventory has been made of the many tests and investigations carried out by universities, industrial foresters, and the state and federal fire control organizations. But although the total cost of these tests undoubtedly exceeds the expenditures for full-time fire research, the total effort appears pitifully inadequate when compared with $20 million spent for fire control and $34 million direct forest fire damages in the South.

So much fire research is needed that only the combined efforts of all those interested can get the job done. Although early increases may be anticipated in forestry research both in fire and in closely related fields, it will not be easy to insure that there are no gaps in the total research program. Close coordination of fire research efforts is needed. To say who should do what specific fire research is not within the scope of this analysis. However, it may not be amiss to indicate types of work that can be bet-

ter done by some organizations than by others.

The universities must be the source of future fire researchers, and all organizations interested in forest fires should encourage and support this training. The botany, psychology, and physics departments of universities may already have both the skills and the facilities needed for specialized basic research, and the forestry departments may have unique opportunities to conduct general fire studies.

State forestry organizations obviously have special interest in and responsibility for investigation of local problems, while region-wide problems may be more effectively studied by the federal experiment stations. Fire control organizations have a continuing job of studying their own operational problems, and need to hire skilled investigators to help in solving local problems of fire prevention, in deciding what types of equipment are most suitable for local use, and in developing applications for the findings of basic research. Industries owning forest lands are specially interested in ways to supplement basic protection and in application of research findings in managing forest lands. They have a compelling interest in evaluating the economies of research findings.

Early solution of the many urgent forest fire problems will be gained only by the expanded and coordinated efforts of all these organizations.

SECTION BOX SCORE 1958 MEMBERSHIP

	Applications Received[1]		
	June 1958	Total 1957	Total 1958
Allegheny	1	68	42
Appalachian	1	71	12
Central Rocky Mountain	6	24	13
Central States	2	30	19
Columbia River	3	55	41
Gulf States	7	84	29
Inland Empire	1	21	14
Intermountain	0	6	31
Kentucky-Tennessee	0	8	3
New England	6	62	40
New York	2	37	20
Northern California	0	39	10
Northern Rocky Mountain	5	49	21
Ozark	1	921	16
Puget Sound	2	61	40
Southeastern	1	132	83
Southern California	0	3	0
Southwestern	0	7	0
Upper-Mississippi Valley	6	69	50
Washington	0	10	1
Wisconsin-Michigan	9	84	53
Totals	53	1,012	538

[1]Student, Junior, Affiliate, Associate (Initial) grades only.

SCHOOL BOX SCORE 1958 MEMBERSHIP

	Student Applications Received		
	June 1958	Total 1957	Total 1958
Alabama Polytechnic Institute	0	19	22
University of California	0	30	56
Colorado State University	6	19	13
Duke University	0	13	2
University of Florida	0	6	14
University of Georgia	0	86	39
University of Idaho	1	19	12
Iowa State College	3	35	17
Louisiana Polytechnic Institute	1	18	5
Louisiana State University	2	41	6
University of Maine	1	31	22
University of Massachusetts	0	10	4
Michigan Coll. of Mining & Tech.	1	29	4
Michigan State University	6	24	21
University of Michigan	1	14	13
University of Minnesota	1	28	26
University of Missouri	0	62	7
Montana State University	5	45	15
State University of New York	0	25	12
North Carolina State College	0	36	1
Oregon State College	1	29	25
Pennsylvania State University	0	32	21
Purdue University	1	18	18
Utah State University	0	5	24
University of Washington	0	27	23
West Virginia University	0	19	15
Yale University	1	7	4
Totals	31	727	441

Rate of Spread and Intensification of Dwarfmistletoe in Young Lodgepole Pine Stands

Frank G. Hawksworth
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CLEARCUTTING is recognized as silviculturally sound for mature even-aged lodgepole pine (*Pinus contorta* Dougl.). It is also a practical means for controlling the widespread lodgepole pine dwarfmistletoe (*Arceuthobium americanum* Nutt.) in conjunction with commercial logging operations. But uncut stands adjacent to the clearcut areas often contain dwarfmistletoe-infected trees; therefore, the amount of infection that develops in the new reproduction from these sources is of great practical importance.

Dwarfmistletoes are spread primarily by an explosive mechanism that forcibly expels the seeds into the air. Dowding (*1*) found that artificially discharged seeds of *Arceuthobium americanum* traveled a maximum horizontal distance of 33 feet. Wind may influence the distance of spread, although its importance varies greatly with species, locality, and type of stand. Spread of the parasite is more rapid from overstory stands to reproduction; lateral spread through even-aged stands, regardless of height or age, is relatively slow. Seeds originating in an overstory tree may strike reproduction anywhere within their effective range. This is a roughly circular area which varies in radius with the species of Arceuthobium. For *A. vaginatum* the effective radius is about 60 feet from the base of a source tree, although occasional seeds travel more than 75 feet (*2*). For *A. americanum* it is presumably about 22 feet. However, precise studies have not been made.

Beyond the limits of the overstory "barrage," spread of the parasite through an even-aged stand is relatively slow but consistently progressive. These basic principles should be considered before attempting to determine periodic rates. This is particularly true when the total time elapsed is relatively short and where the first understory trees to become infected might by chance be near the outer limits of the overstory "barrage."

Hedgcock (*3*) estimated that *A. americanum* spread at a rate of 6 to 12 feet a year in a burned-over lodgepole pine stand near Fraser, Colorado. Parker (*4*) noted an infection center in lodgepole pine in Alberta, where the same species spread over an area of 1.57 acres in 60 to 70 years, or about 2 feet a year, assuming the area was circular. The latter is more in keeping with the findings of the study reported here. Hedgcock's publication does not mention that his data are based on spread from isolated overstory trees, but unpublished parts of his original manuscript leave no question on this point. The manuscript indicates that his studies were made in 35-year-old reproduction.

In 1953, rate of spread of dwarfmistletoe from mature lodgepole pine stands into adjacent regeneration was studied in 13 areas on the Roosevelt and Routt National Forests, Colorado, and on the Medicine Bow National Forest, Wyoming. Twenty additional study areas were established in 1955 on the Big Horn National Forest, Wyoming.

Methods

It was impossible to obtain reliable measurements of spread in clearcut areas because numerous overlapping centers of infection had developed wherever diseased unmerchantable trees had been left. These studies, therefore, were conducted in burned-over lodgepole pine. Sampling of burns made it possible to examine older stands of reproduction than were available in clearcut areas. Burns in which there had not been a complete kill were excluded to avoid complicated infection patterns characteristic of commercial clearcuttings. The information obtained from burns should be applicable to more completely clearcut areas where all infected trees are removed as a sanitation measure.

Plots were located only where there was an abrupt line between the reproduction on the burn and an adjacent unburned, heavily infected, mature stand (Fig. 1). For the purposes of the study, "heavily infected" stands were defined as those in which more than two-thirds of the merchantable trees had dwarfmistletoe. When a suitable study area was located, the age of the reproduction was determined, and the maximum distance of dwarfmistletoe invasion into this stand was measured. Distances were measured from the boles of the mature stand to the bole of farthest infected young tree. Additional information on the intensity of infection at various distances from the edge of the mature stand was obtained on ten of the study areas.

Results

The maximum distances dwarfmistletoe had progressed from the

[1]Maintained by the Forest Service, U. S. Department of Agriculture, with central headquarters in cooperation with Colorado State University at Fort Collins. The author gratefully acknowledges the assistance of Thomas E. Hinds, forestry aide.

FIG. 1.—A typical study area on the Big Horn National Forest, Wyoming. A sharp line separates the infected mature stand and the young lodgepole pine reproduction that developed after a fire. The maximum distance dwarfmistletoe had invaded this open stand of 48-year-old reproduction was 73 feet.

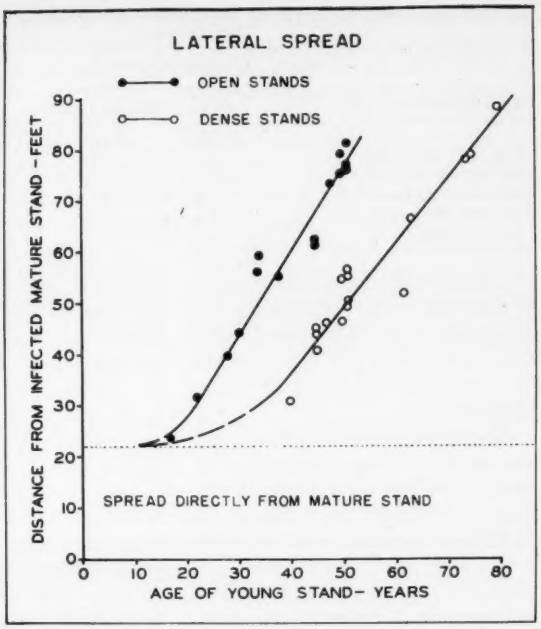

FIG. 2.—Maximum distances of invasion of dwarfmistletoe from mature lodgepole pine stands into regeneration, based on 31 study areas in Colorado and Wyoming.

edges of heavily infected mature stands into adjacent reproduction are shown in Figure 2. The horizontal dotted line at 22 feet indicates the assumed limit of spread directly from the mature stand. This distance was estimated from a single stand less than 20 years old, which was visibly infected. Beyond this point the infection presumably progressed from seed originating in the reproduction.

The rate of spread through open and dense stands differs widely. Dense stands were defined as those in which the canopy had closed; open stands are those in which it had not. Since all very young stands are open by this definition, the lower end of the "dense" curve has been extrapolated to suggest the period of transition while the crowns are closing. Beyond about 30 feet, both curves are linear. This point is reached in approximately 20 years in stands that remain open; whereas an additional 15 years is required in dense stands. Beyond 30 feet, the average rate of progress is about 17 feet a decade in open stands and 12 feet in dense ones. After reproduction has been subjected to infection for 30 years, the parasite can be expected to progress to about 30 feet into a dense stand or 45 feet into an open one. The reasons for these differences are not fully understood, though there seems to be one plausible explanation: in open stands, the seeds generally fly farther because there is less obstruction.

The early stages of spread are complicated by several factors. First of all, the young stands are subject to infection anywhere within the effective range of the seeds from the overstory. Furthermore, very young trees present poor targets because of their size. Dwarfmistletoe shoots are seldom abundant in stands younger than 15 years although infection often takes place earlier. This was noticed in two of the present study areas in 10- and 12-year-old reproduction. Trees here showed no infections with shoots but doubtless were diseased, as they were adjacent to heavily infected mature stands. It is apparent, therefore, that any calculations for the periodic rate of spread for stands less than 20 years old would be of little significance.

The linear parts of the curves are based on apparent infection only. The true infection for a given distance would have occurred perhaps five years earlier than the graphs indicate. Had it been possible to plot true infection, both curves would have been shifted slightly to the left and the "open" stand line at least would have intersected the 22-foot mark at approximately 10 years.

Since westerly winds predominate in the localities studied, a higher rate of spread from west to east than from east to west would be expected if winds contribute to the dispersal of *A. americanum*. Actually the rate of spread in all directions was about the same (Table 1).

An analysis similar to that summarized in Table 1 showed that there was also no discernible relationship between the rate of spread and degree of slope, at least within the range of slope of the areas studied (plus 30 percent to minus 40 percent).

The foregoing discussion has

TABLE 1.—RATE OF SPREAD OF DWARFMISTLETOE IN RELATION TO DIRECTION OF INVASION

Direction of invasion	Open stands		Dense stands	
	Study areas	Average annual spread	Study areas	Average annual spread
	Number	*Feet*	*Number*	*Feet*
North and northeast	7	1.5	3	0.9
East and southeast	2	1.5	2	0.9
South and southwest	3	1.4	8	1.0
West and northwest	3	1.5	3	1.1
Total or average	15	1.5	16	1.0

considered only maximum spread. It does not cover damage or the control problems that may develop with time. These are dealt with in the following discussion of intensification.

Intensification of dwarfmistletoe was studied in ten stands, nine of which were less than 40 years old. Figure 3 shows the amount of dwarfmistletoe that occurred within 30 feet of infected mature stands. Because of the small basis, the data for open and dense stands were combined. The information available, however, indicates that within this zone, the proportion of the trees infected is markedly greater in open than in dense stands of the same age. Very little infection was apparent in stands less than 15 years old, and about 10 percent of the trees are visibly infected after 20 years. However, infection increased rapidly in older stands: 35 percent at 30 years and 50 percent at 40 years, reaching 99 percent in the single 80-year-old stand measured.

The percentage of young trees infected with dwarfmistletoe at various distances from the mature stand is shown in Figure 4 for two of the study areas: in dense, 80-year-old reproduction and in open, 34-year-old reproduction. As would be expected, the incidence of infection was highest adjacent to the mature stand. In 80-year-old reproduction the zone of high dwarfmistletoe incidence extended out about 60 feet from the mature stand (97 percent of the trees within this distance were infected). In 34-year-old reproduction the zone of heavy infection was within 30 feet of the mature stand (77 percent of the trees within this zone were infected).

Data on trunk infections are included in Figure 4 to give some indication of the severity of dwarfmistletoe attack. Time was not available to make counts of the number of infections in each tree on the study areas. As a general rule, trunk infections are most common in heavily infected trees. Also, trunk infections are more damaging to their hosts than are branch infections. Trees with trunk infections cannot be saved by pruning. The proportion of such trees was considerably higher in the 80-year-old reproduction (71 percent) than in the 34-year-old reproduction (44 percent).

Discussion

The distances to which dwarfmistletoe may be expected to invade young lodgepole pine stands of different ages and densities are

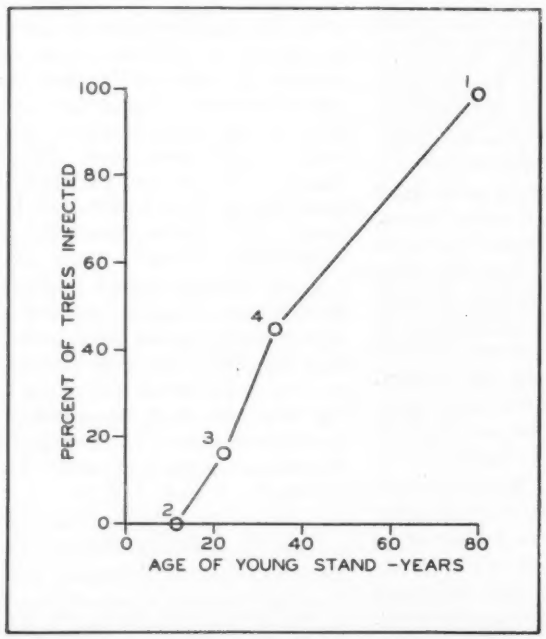

FIG. 3.—Incidence of dwarfmistletoe in lodgepole pine regeneration within 30 feet of infected mature stands, based on 10 study areas in Colorado and Wyoming.

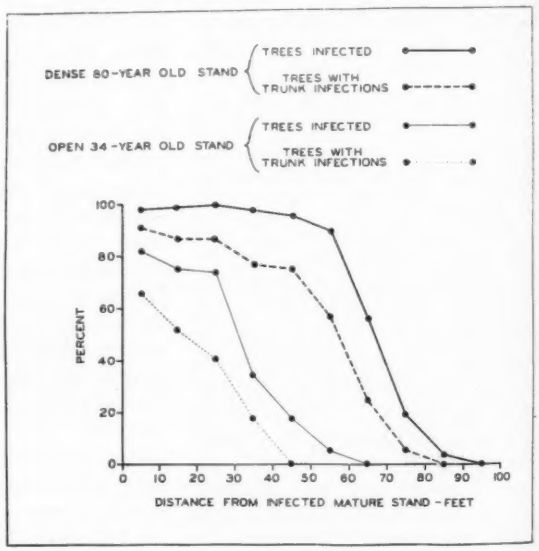

FIG. 4.—Proportion of trees with dwarfmistletoe and percentage of infected trees with trunk infections in 2 lodgepole pine stands in Colorado. The older sample is a dense pole stand on the Roosevelt National Forest and the younger one is an open-grown stand on the Routt National Forest.

shown in Figure 2. Although this figure gives distances of spread of dwarfmistletoe for stands up to 80 years old, in clearcut areas the uncut blocks or strips are normally scheduled to be cut within 20 to 30 years after the initial logging. From the standpoint of dwarfmistletoe reduction, it is desirable to remove adjacent infected stands as soon as possible, preferably before the reproduction is established on the initially clearcut areas. This can seldom be done. The results of this study suggest that if the remaining stands are left for 20 years, the maximum distance to which mistletoe infection will progress into the reproduction on the initial cut-over area during this period should be about 30 feet. Therefore, if all infected lodgepole pines, both merchantable and unmerchantable, are felled in conjunction with the initial clearcutting, dwarfmistletoe in the new reproduction should be confined to a ½-chain strip adjacent to infected parts of the uncut stand. Dwarfmistletoe will, of course, continue to invade the young stand after the remaining stands are harvested unless control measures are taken.

Similarly, without control, dwarfmistletoe once established in the initially cut area will slowly invade the new reproduction following clearcutting of the remaining stands. The optimum time to conduct timber stand improvement operations to reduce dwarfmistletoe in the reproduction would be during or shortly after clearcutting of the remaining blocks or strips. If possible, provision should be made for a second cleaning several years later to eliminate those infections that had not developed shoots and would therefore be overlooked on the original treatment (*2*).

Summary

Studies were made in 33 burned-over lodgepole pine stands in Colorado and Wyoming to determine how fast dwarfmistletoe can be expected to spread from residual stands to reproduction on clearcut areas. The results indicate that in about 20 years, dwarfmistletoe will have progressed less than 30 feet in the reproduction. In 30-year-old reproduction, the parasite will have spread 30 to 45 feet, depending primarily on the density of the young stand. Spread through young lodgepole pine is 1.5 times greater in stands in which the canopy has not closed than in stands with closed canopies. In 20-year-old stands, about 10 percent of the trees within 30 feet of an infective mature stand were infected. In 30-year-old stands, infection in this zone was about 35 percent.

Literature Cited

1. DOWDING, ELEANOR S. 1929. The vegetation of Alberta III. The sandhill areas of central Alberta with particular reference to the ecology of *Arceuthobium americanum* Nutt. Jour. Ecology 17:82-105.
2. GILL, L. S., and F. G. HAWKSWORTH. 1954. Dwarfmistletoe control in southwestern ponderosa pine forests under management. Jour. Forestry 52:347-353.
3. HEDGCOCK, G. G. 1913. Notes on diseases caused by mistletoe. Wash. Acad. Sci. Jour. 3:265-266.
4. PARKER, H. A. 1942. Control of mistletoe. Dominion Forest Service, Canada, Silvicultural Leaflet No. 15. 2 pp.

International Commission for the Nomenclature of Cultivated Plants Issues Code

The Commission has just issued the *International Code of Nomenclature for Cultivated Plants* (28 pages, Utrecht, Netherlands, 1958). This Code will be of particular interest to forest geneticists and others in forest tree improvement programs who may be naming new varieties. Copies of the Code may be purchased for fifty cents each from the distributor for the United States representing the American Horticultural Council, Dr. Donald Wyman, Arnold Arboretum, Jamaica Plain 30, Mass.

With twenty-five members from various countries representing horticulture, agriculture, and forestry, the Commission is sponsored by the International Union of Biological Sciences. Previous work has been reviewed in the JOURNAL OF FORESTRY (54: 660. 1956; 55: 299. 1957). The first meeting was held at Utrecht, Netherlands, November 21-23, 1956, and the second at the Royal Horticultural Society in London, England, December 4-6, 1957. Elbert L. Little, Jr., is forestry representative from the United States and also forestry member of the editorial committee. Principal items of business at the London meeting were consideration of additional proposals for the Code and approval of the Code for publication.

The Code serves as a guide for naming cultivated plants in horticultural, agricultural, and silvicultural crops and provides rules for publication and registration. It aims to promote uniformity, accuracy, and fixity in naming varieties or cultivars (the international term), which normally are given names in modern languages. After January 1, 1959, new variety names must be published with a description in any language. However, it is strongly recommended that English, French, German, Russian, or Spanish be used for the description or for a translation or summary. When there are linguistic and other difficulties in other countries, translation or transliteration of names is allowed.

The appendix to the Code contains recommendations for the guidance of registration authorities and a list of international registration authorities. The only international registration authority listed for forest trees is the International Poplar Commission, appointed by the Food and Agriculture Organization of the United Nations, for forestry varieties of the genus Populus.

Replacing an earlier one published by horticulturists in 1953, the new Code is submitted for endorsement for forestry to the International Union of Forest Research Organizations. Any matters for the attention of the Commission may be sent to the undersigned.

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A 10-Year Record of Pine Seed Production On The Hitchiti Experimental Forest

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IF STANDS OF loblolly-shortleaf pine are to be regenerated successfully, adequate seed at time of harvest is of paramount importance. As a gauge of the seed production potential of various stand types, an annual record of seedfall has been kept on the Hitchiti Experimental Forest, near Macon, Georgia, and a 10-year summary of this record indicates that shelterwood produces the most dependable supply of seed.

A good deal of work has been done by other investigators in different localities to determine what constitutes a good seed tree, and how many of them should be left per acre for restocking the land under various seedbed conditions. In general, the findings on the Hitchiti Experimental Forest support the work of other researchers.

Method of Study

Seed production was estimated each year from 1947 to 1956 in four stands that differed in age, stocking, and cutting treatments (Table 1). Mature, uncut stands were more heavily stocked than the average in the Piedmont; immature, uncut stands were more lightly stocked and typical of Piedmont pine stands; and seed-tree and shelterwood stands were the result of planned cutting. Loblolly pine (*Pinus taeda* L.) constituted, on the average, 85 percent of the sawtimber volume. The remainder consisted of shortleaf pine (*P. echinata* Mill.), which was more strongly represented in localized areas, and negligible amounts of hardwoods.

Twenty-five seed traps, each 2 square feet in area, were placed in two stands of each kind. Because of scheduled cutting operations, the traps had to be removed from all but three stands some time during the 10-year period. In these cases they were placed in other stands of corresponding stocking, age, and average diameter.

The trapped seed was counted at 3-week intervals from mid-October until Christmas each year. Viability was determined by cutting tests.

Seed Production

The 10-year record of seed production is summarized in Table 2. The total production of sound seed for the four kinds of stands shows that the shelterwood stands produced 2.2 times as much seed as the mature, adequately stocked stands, while the seed-tree stands produced 0.76 times as much. Thus, the seed-tree stands produced nearly as much seed as the mature, uncut stands even though they had only about one-fourth as many trees and were not under the stimulus of release for the full period.

The seed requirement for satisfactory stocking of reproduction has not been determined for the Piedmont, but in the Coastal Plain of North Carolina about 30,000 are required on undisturbed litter to obtain 90 percent milacre stocking of seedlings (*3*). Both seed-tree and shelterwood stands on the Hitchiti produced more than 30,000 sound seed per acre in 1952 and 1955—the two bumper seed years. That requirement was also exceeded by one shelterwood stand in 1951 in response to release, and by the other in 1947, a moderately good seed year. More than 120,000 sound seed per acre were produced by both kinds of cut stands in 1955, the best seed year of the 10-year period, and by the more fruitful shelterwood stand in the other bumper seed year, 1952, in response to release.

This level of seed production is

TABLE 1.—DESCRIPTION OF STANDS IN WHICH SEEDFALL RECORDS WERE OBTAINED

Kind of stand	Average age	Average d.b.h. of sawtimber	Average basal area per acre		Area Sampled
			Sawtimber	Total	
	Years	*Inches*	*Sq. ft.*	*Sq. ft.*	*Acres*
Mature, adequately stocked	50	13	48	69	152
Immature, open-grown	30	12	28	44	37
Seed tree	55	15	13	14	44
Shelterwood	60	14	25	30	33

TABLE 2.—NUMBER OF SOUND SEED PRODUCED BY FOUR TYPES OF PINE STANDS

Year	Mature adequately stocked	Immature open-grown	Seed tree stands		Shelterwood stands	
			No. 1	No.2	No. 1	No. 2
	Sound seed per acre					
1947	23,925	30,450	6,960	.....	73,950	.....
48	7,830	6,960	12,180[1]	.....	9,570[1]	.....
49	2,610	1,305	1,740[1]	.....	1,740[1]	.....
50	2,610	1,740	2,610[1]	.....	0	.....
51	10,660	870	.....	13,050	.....	45,240
52	138,765	80,040	.....	73,080	.....	304,500
53	435	1,720	.....	8,710[1]	.....	6,970[1]
54	2,175	0	.....	6,090[1]	.....	13,050[1]
55	214,455	130,065	.....	184,440[1]	.....	445,440[1]
56	2,175	0	.....	870[1]	.....	8,710[1]

[1]Seed production three or more growing seasons after cutting.

much lower than that observed in the Santee Experimental Forest near Charleston, South Carolina, where a 40-year-old partially cut stand produced more than 200,000 sound seed per acre in every year except one, from 1946 to 1955 (*2*). That seed production is considerably lower in the inland portions of the loblolly pine range than in the Coastal Plain (*4*) is clearly shown by the general level of seed crops in mature uncut stands, which are not affected by a response to release (Fig. 1). A 70-year-old stand in the Duke Forest in the North Carolina Piedmont (*1*) and a 50-year-old stand in the Hitchiti Experimental Forest produced, on the average, less than one-third as much sound seed annually during a 7- and 10-year period, respectively, as a 95-year-old stand in the Bigwoods Experimental Forest[1] (Coastal Plain) produced during a 10-year-period. The Bigwoods and Hitchiti records covered the same 10-year period, 1947 to 1956, while the Duke Forest record covered the period from 1936 to 1942.

The response to release is apparently not so consistent nor so pronounced in the Piedmont as in the Coastal Plain. In the North Carolina Coastal Plain, released trees produced enough sound seed even in a poor seed year for satisfactory stocking of reproduction on a prepared seedbed (*5*). In contrast, the seed crops of the Hitchiti stands expressed in terms of production per sawtimber-size tree show that in poor seed years even released trees did not produce enough seed for satisfactory regeneration, although they regularly produced much more seed than unreleased trees (Table 3).

This information indicates, therefore, that in the Piedmont much larger numbers of seed trees will be needed than in the Coastal Plain and that full use must be made of release in advance of the harvest cut to get satisfactory natural regeneration. These requirements lead to the so-called shelterwood system, in which a large number per acre of the best trees are left to provide seed. Since cones require two growing seasons to reach maturity and flower buds are set in the growing season before flowering, no appreciable increase in seed production can be expected until three growing seasons after release. However, development of full seed may be promoted by improved moisture and nutrient supplies following the removal of competition, so some response may be possible two seasons after release. Scarification will provide favorable seedbed conditions but should not be used unless the prospective seed crop promises to be adequate. Consequently, satisfactory stocking of reproduction can probably be obtained in loblolly pine areas in the Georgia Piedmont by means of shelterwood stands and scarification in anticipation of adequate seed crops, which in turn occur in good seed years and as a result of release. But satisfactory stocking cannot be guaranteed, because rainfall distribution following seedfall is also of paramount importance. For example, rainfall after the good seed

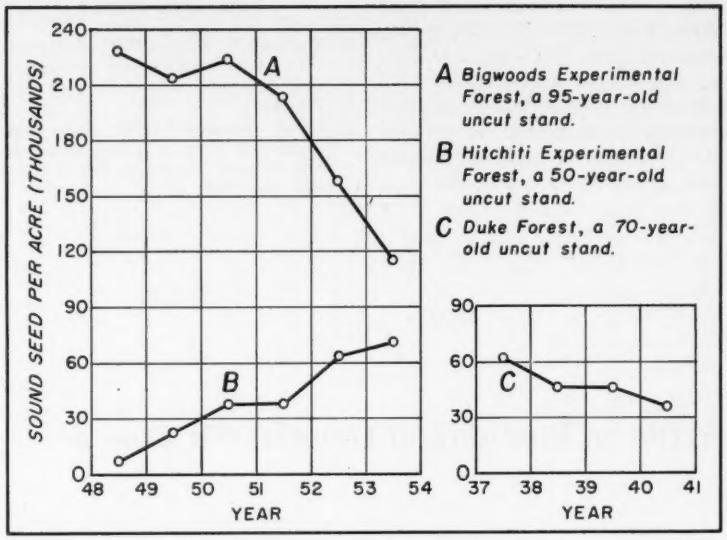

FIG. 1.—Seed production trends for loblolly pine in the Coastal Plain (*A*) and Piedmont (*B*) as shown by 4-year moving averages.

TABLE 3.—NUMBER OF SOUND SEEDS PRODUCED BY INDIVIDUAL SAWTIMBER-SIZE TREES

Year	Uncut stands		Seed tree stands		Shelterwood stands	
	Mature	Immature	No. 1	No. 2	No. 1	No. 2
	Number of seeds					
1947	478	1,144	348	———	2,739	———
1948	157	235	609[1]	———	354[1]	———
1949	52	44	87[1]	———	64[1]	———
1950	52	59	130[1]	———	0[1]	———
1951	320	30	———	2,175	———	2,056
1952	2,832	2,684	———	12,180	———	13,840[1]
1953	9	60	———	1,452[1]	———	317[1]
1954	44	0	———	1,015[1]	———	593[1]
1955	4,377	4,324	———	30,739[1]	———	20,245[1]
1956	30	0	———	67	———	348[1]

[1]Seed production three or more growing seasons after cutting.

[1]Maintained in Hertford County, N. C., by the U. S. Forest Service in cooperation with the Camp Division of the Union Bag-Camp Paper Corporation, Franklin, Va.

crop of 1952 was deficient and no appreciable catch of seedlings was obtained from that crop. Following the bumper seed crops of 1946 and 1955, good rainfall distribution was instrumental in restocking thousands of acres of loblolly pine in the lower Piedmont.

Literature Cited

1. JEMISON, G. M., and C. F. KORSTIAN. 1944. Loblolly pine seed production and dispersal. Jour. Forestry 42: 734-741.
2. LOTTI, THOMAS. 1956. Good seed production from a young stand of loblolly pine. Southeast. Forest Expt. Sta. Res. Note 97.
3. TROUSDELL, KENNETH B. 1950. Seed and seedbed requirements to regenerate loblolly pine. Southeast. Forest Expt. Sta. Paper 8, 13 pp., illus.
4. WAKELEY, PHILIP C. 1947. Loblolly pine seed production. Jour. Forestry 45:676-677.
5. WENGER, KARL F. 1955. Seed tree requirements in loblolly pine. South. Lumberman 191(2392):116-118, Dec. 15.

Artificial Ripening of Douglas-Fir Cones

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DOUGLAS-FIR (*Pseudotsuga menziesii* [Mirb.] Franco) seed is seldom fully ripened on the tree before late August in the Pacific Northwest. Since natural seed fall may begin as early as the last week in that month, the cone collecting period is often short. Lengthening of this period is a worthwhile goal, for it would permit better organization of cone collection and allow skilled personnel to collect more of the crop. Artificial ripening of seed in cones picked in early August now appears to be a distinct possibility.

The idea that cones might be ripened off the tree has probably been advanced many times. Dr. J. W. Duffield, Industrial Forestry Association geneticist, has suggested that squirrels, in their storage methods, might provide conditions for ripening immature cones. The present study stems from an exploratory study of simulated squirrel caches in 1954 by the author and Richard C. Koenig on the H. J. Andrews Experimental Forest. Cones collected early and stored in sandy soil were found to have an appreciable percentage of germinable seed.

The Study

A study was begun during the summer of 1956 to determine whether seed from immature cones could be ripened artificially and, if so, whether the seed and seedlings produced were normal in size and weight. Five cone-bearing trees ranging from 50 to 100 feet tall were chosen near the Wind River Nursery in southwestern Washington; cones were collected from these trees on July 11 and at 10-day intervals until August 30. A collection planned for September 10 could not be made because many of the cones had opened and shed their seed.

Each collection consisted of 60 cones picked from over the whole crown of each tree. These were mixed and divided into 3 lots of 20 cones, each lot to be stored separately under 1 of 3 conditions:

1. *Dry storage.* Cones were spread on screen trays and stored in racks in a shed that was open to the air on all sides. Temperatures varied between 60° and 80°F.

2. *Damp storage.* Cones were stored between layers of damp peat moss in powder boxes in a dark cellar, where temperatures were uniformly about 63°F. Peat moss was chosen to inhibit mold development.

3. *Wet storage.* Cones were stored in hardware cloth enclosures and immersed in well-aerated water (about 56°F.) of the fish ladder on Trout Creek Dam, near the Wind River Nursery. This treatment was begun with the August 1 collection, whereas the other two treatments were begun with the July 11 collection.

The various lots were kept in storage until September 30 in order to allow the damp-stored cones to mature. Then they were stored in air until October 11, when they were kiln dried at 110°F. maximum temperature.

After drying, some of the cone scales remained closed in some lots. In order to eliminate any possible bias from the failure of some cone lots to shed their seed uniformly, all seed was extracted by hand by breaking the scales apart where necessary. Except for occasional small seeds in the tip or base of the cone, every seed was extracted.

The lots were cleaned in a Dakota blower to remove as much of the debris as possible without losing any of the seed. Then, a random sample of 200 seeds was counted by hand from each lot for a germination test. An additional sam-

[1]Cooperators in the study were Forrest Deffenbacher and James Hutchins of the U. S. Forest Service Nursery, Carson, Wash., who collected and extracted the seed. Germination tests were made at the Cooperative Seed Testing Laboratory, Corvallis, Ore. William Scheuner made observations of the seedlings as a student project at Oregon State College. Seed weights were determined by Peter H. Geiger, U. S. Forest Service.

ple was set aside for a later seed weight test.

The germination test was carried out with four 50-seed sub-samples from each lot placed on moist river sand in plastic dishes. Seeds were prechilled for 2 weeks at 3°C., then they were germinated at alternating temperatures of 20° and 30°C. for 7 weeks. To watch for evidence of possible abnormal development in lots from early collections, half the germinated seedlings from each lot were planted in flats in river sand and grown in a greenhouse for 5 weeks.

Finally, in order to test whether or not the seed had gained weight during storage, five kernels from each dry-stored and damp-stored seed lot were decoated and dried at 80°C. for 16 hours to obtain ovendry weight. Weights were not obtained for wet-stored seeds.

Germination, seedling data, and seed weight were tested by analysis of variance.

During the course of the study, supplementary examinations were made to determine differences in embryo development for the three storage methods. Seeds from each lot were dissected August 2 and August 23.

For cones receiving normal dry storage, "endosperms" (female gametophytes plus integuments) were usually shrunken and embryos shriveled shortly after picking. Embryos in cones receiving wet storage seemed to be developing normally on August 23, except that some from the early collected lots appeared to be slightly more yellow than normal.

TABLE 1.—GERMINATION PERCENTAGES OF SEED FROM CONES COLLECTED AT 10-DAY INTERVALS AND STORED UNDER DRY, DAMP, AND WET CONDITIONS

Cone storage method	Tree No.	Collection date: July 11	July 21	Aug. 1	Aug. 10	Aug. 20	Aug. 30
Dry	1	0	0	0	0	6	28
	2	0	0	0	0	48	32
	3	0	0	0	0	8	40
	4	0	0	5	0	4	35
	5	0	0	0	0	45	50
	Average	0	0	1	0	22	36
Damp	1	0	0	22	38	18	18
	2	0	0	6	39	48	33
	3	0	0	27	14	15	32
	4	0	2	59	38	23	24
	5	0	4	40	30	48	40
	Average	0	1	31	32	30	29
Wet[1]	1	–	–	0	0	0	2
	2	–	–	0	0	2	39
	3	–	–	0	0	0	0
	4	–	–	0	0	0	2
	5	–	–	0	0	0	39
	Average	–	–	0	0	0	17

[1]Treatment begun with August 1 collection.

Embryos continued to develop in all damp-stored lots. Except for the July 11 collection, embryos were nearly equal in length to those in freshly collected cones and slightly lighter in color. When examined on August 23, some developing embryos were even found in cones from the July 11 collection. Except in some of the lots from the July 11 collection, endosperms were firm.

There were large differences between the five parents in the percentage of seeds containing embryos.

Results

Germination. — Germination results were very clearcut. The damp-stored lots collected from August 1 on gave good germination (29 percent or better), whereas the dry-stored lots collected before August 30 did not. The wet storage method gave either poor or no germination (Table 1 and Fig. 1.).

The low average germination percentages over the whole study are explained by the sampling procedure. Wormy or otherwise defective cones were not culled. (Cones from individual trees showed insect damage ranging from 22 percent to 41 percent of the total.) During extraction and cleaning every seed in the cone was recovered, whether flat or hollow. A uniform procedure was necessary to keep the lots strictly comparable for germination tests. The fact that germination percentage in no case exceeded 59 percent points up the high proportion of poor seed usually removed by selective cone collection methods and

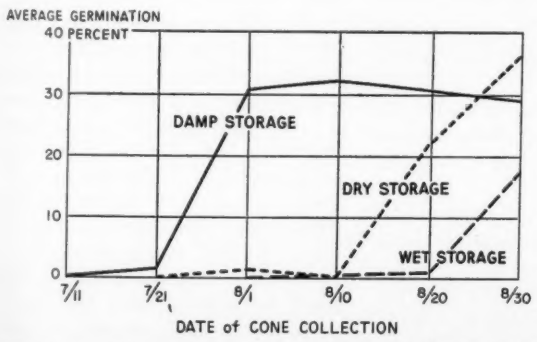

FIG. 1.—Average germination percentages of seed, by collection date, from cones stored in dry, damp, and wet storage.

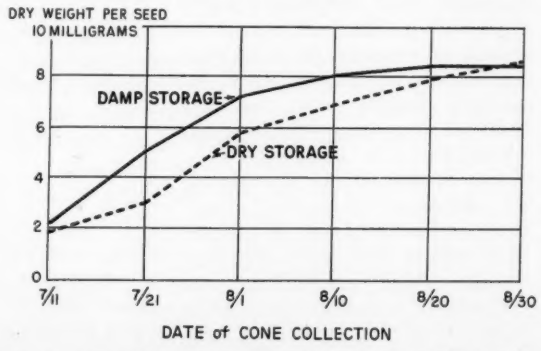

FIG. 2.—Oven-dry weight of decoated seed, by collection date, for damp and dry cone storage treatments.

effective cleaning in commercial operations. The germination percentages reported here represent true germination capacity of natural seed without any mechineal screening.

Considering these results in greater detail, dry cone storage gave no or insignificant germination for collections made from July 11 to August 10. The August 20 collection was significantly lower in germination than the August 30 collection (21.7 percent compared to 36.2 percent). However, there was considerable tree-to-tree variation. Seed obtained from one tree on August 20 germinated better than seed collected on August 30.

The germination of the damp-stored lots collected on July 11 was zero and 1.3 percent for the July 21 collection. Thereafter, germination climbed to 30 percent or higher, a percentage not significantly different from that obtained from dry storage with the August 30 collection. As in the case of dry storage, variation with parentage was evident; some trees showed their highest germination in lots collected as early as August 1, others not until August 30, and some at an intermediate date. No collection after August 1 gave a significantly higher average result than others.

Wet storage resulted in no germination for the collections of August 1 and August 10, only 0.3 percent for August 20, and 17.3 percent for the final collection on August 30. At best, wet storage was poorer than dry storage.

Seedling growth.—For the damp treatment, the seedlings showed slight but significant differences in growth as measured by length of cotyledons and epicotyl. On the average, epicotyl length was less by about 17 percent (0.48 inch vs. 0.58 inch) in the August 1 collection as compared with the August 30 collection. Cotyledon length also was less by about 14 percent (0.75 inch vs. 0.87 inch). The percentage of abnormal seedlings was very small in all collections. Data taken on relative numbers of seedlings with seed coat growth restrictions and abnormal stem color, and the numbers (few) lost to damping off showed no apparent relation to date of collection.

Seed weight.—Dry-weight comparison after storage of seed kernels from the same collection should indicate whether or not the seeds received nutrients from the cone while in storage. The dry-stored cones quickly became too dry for further development, whereas the damp-stored cones stayed fresh and green.

Kernels of seed from early collections placed in damp storage weighed appreciably more after storage than kernels from corresponding lots of dry-stored cones (Fig. 2). The average difference in seed weight was 1.4 milligrams for the July 21 collection but became progressively less for later collections, as would be expected. This difference represents weight gains from damp storage as much as 37 percent over corresponding dry-stored lots, particularly in the case of the July 21 collection.

An indication of possible loss of vitality resulting from early collection is provided by the comparison of dry weight of damp-stored lots collected on August 1 with that of lots collected when fully ripe on August 30. This difference averaged 1.2 milligrams per seed (14 percent) based on the average weight on August 30.

Discussion

The study fulfills the immediate purpose: to determine if seed in cones picked early in the season would ripen under some artificial treatment. The storage in damp peat moss proved to be effective whereas neither the more drastic wet treatment nor normal dry storage was effective.

With the possibility of early cone collection established, there remains the problem of finding a commercial method. Some further developments are suggested by this study. First, a successful method seems to depend on keeping the cones fresh until the seed ripens. The cones in this study that were individually packed in damp peat moss retained a fresh appearance for from 30 to 40 days. For instance, those collected on July 11 were fresh until August 20, but the scales had died by August 30. Cones collected on August 30 were still green when removed from storage September 30. Apparently the food necessary for continued seed development is available in the cones as early as August 1 and perhaps earlier, but the cones must be kept moist for seed maturation to take place.

It appears also that oxygen levels must be kept above those in well-aerated water. Lack of germination under wet storage conditions most likely was due to oxygen deficiencies. Any storage treatment based on wetting or spraying should be tested for possible oxygen deficiencies.

Mold may be one of the obstacles to extraction of seed from early cone collections. In this study, the earlier collections in damp storage became heavily molded between August 20 and October 11. For this reason, considerable differences were observed in various lots during seed extractions, even though the final germination percentages were similar. The wet-stored cones were by far the easiest to extract from because all the scales became widely extended. They showed no mold even though they were somewhat slimy when removed from the fish ladder September 30.

The dry-stored cones opened uniformly, but the scales were not spread widely enough for easy extraction. Removal of seed from the damp-stored lots was even more difficult because mold had caused many of the scales to remain closed. Later collections were not as badly affected and the August 30 collection particularly, which was still green at time of removal from storage on September 30, gave little difficulty. This points up the distinct possibility of eliminating such troubles from mold. As long as the cones remain alive they are free of mold. If they could be removed just before the scales die, mold might be avoided, and the cones would likely open without serious hindrance.

The second purpose of the study

was to determine whether or not the seed from early picked cones would produce good nursery stock. This is only partially answered. Small but statistically significant growth differences were found in the 5-week-old seedlings of the lots picked on August 30 and those from the lots picked earlier. Measurable differences in other characteristics were not found. Insufficient seed was available to make nursery tests.

Data from the oven-dry seed kernel weights give a picture consistent with seedling measurements. It is interesting that reductions in cotyledon growth, epicotyl growth, and dry seed weight between the August 1 and August 30 collections were 17, 14, and 14 percent, respectively. Whether this similarity in percentage between measurements is accidental or reflects a meaningful reduction in seedling vigor will require further testing for an answer.

In these measurements, the reduction in seed weight and seedling growth was much less for the August 10 collection than for the August 1 collection. Hence the risk of producing a lighter, less vigorous seedling would be reduced by collecting after August 10, which would still extend the cone collection period considerably.

The curves of oven-dry seed weight (Fig. 2) and germination percentages (Table 1) bear further inspection. Little germination occurred from either dry- or damp-stored seed until kernels averaged over 7 milligrams; fully matured seedlings were produced when the kernels averaged over 8 milligrams. Criteria have been sought for assessing the maturity of Douglas-fir seed during cone collection, such as floatation of cones in solvents, cone color, or embryo size. Since none has been developed so far, the leveling off of the curve of average seed kernel dry weight is suggested for further investigation as a possible criterion.

Summary

A study to determine whether or not Douglas-fir seed from cones picked early in the season could be artificially ripened was made on cones collected from five trees near the Wind River Nursery, Carson, Wash. Collections were begun on July 11 and continued at 10-day intervals until seedfall in early September. Of three storage methods tried, cones stored at about 63° in damp peat moss gave full germination for collections made on August 1 and later. Storage in a running stream gave lower germination than other methods. Normal dry storage of cones in air gave no appreciable germination for collections prior to August 20 and even this collection yielded only about two-thirds of the germination obtained from the collection on August 30. Hence the damp-storage method is shown to be effective in ripening the immature cones and their seeds.

Seeds in the damp-stored lots, however, were more difficult to extract due to mold on the cones. Seedlings from damp-stored lots picked as early as August 1 were apparently normal but showed slightly less cotyledon and epicotyl growth. Dry-weight measurements of the seed kernels showed that damp storage of cones collected on August 1 resulted in seed only slightly under full weight.

The artificial ripening of seed in immature cones by some commercial method of damp storage appears possible for Douglas-fir. This may greatly lengthen the period of cone collection for this species, or provide a method of handling cones inadvertently picked before they are fully ripe.

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The Small Oak Barkbeetle Transmits The Oak Wilt Disease[1]

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THE RESULTS of oak wilt vector studies in Missouri provide additional evidence that the small oak barkbeetle (*Pseudopityophthorus minutissimus* [Zimm.]) may help spread oak wilt disease. This insect is being studied because (1) it breeds by the millions in the outer sapwood of small stems and branches of trees killed by oak wilt and in logging slash, and (2) it feeds in twig crotches, at the bases of leaf petioles, and on small stems at rough places on the bark and thus makes injuries that may serve as infection courts. In previous studies Stambaugh[2] and the author[3] found the oak wilt pathogene *Ceratocystis fagacearum* (Bretz) Hunt in or on the bodies of beetles that developed in and emerged from diseased trees. Recent tests in Missouri have provided two specific cases in which oak wilt was transmitted by these small oak barkbeetles.

More than 150,000 small oak barkbeetles have been used in oak wilt vector tests during the 6-year period 1952-1957. These tests were made on 241 northern red, pin, and black oak seedlings (*Quercus rubra* L., *Q. palustris* Muenchh., *Q. velutina* Lam.) growing in a nursery near New Franklin, Missouri. The seedlings were 3 to 10 feet tall and 3 to 8 years old, and were in good vigor when they were exposed to the test insects.

The tests included the following six combinations of three sources of inoculum and two methods of releasing insects into cages that enclosed all (Fig. 1) or parts (Fig. 2) of the test seedlings.

1. a. Bolts, containing about 120,000 beetles,[4] from naturally in-

[1] Joint contribution from the Central States Forest Experiment Station, Forest Service, U. S. Department of Agriculture, and Missouri Agricultural Experiment Station (Journal Series No. 1845, approved by director).

[2] Stambaugh, W. J., C. L. Fergus, F. C. Craighead, and H. E. Thompson. 1955. Viable spores of *Endoconidiophora fagacearum* from bark and wood-boring beetles. Plant Disease Reporter 39:867-871.

[3] Buchanan, William D. 1956 preliminary tests indicate that the small oak barkbeetle may be a vector of the oak wilt fungus. Plant Disease Reporter 40: 654.

[4] No insects other than *P. minutissimus* were found in the bolts used in these tests.

FIG. 1.—Cages such as this were used to enclose the entire test seedling. Beetle infested bolts and leaves on the enclosed seedling are visible through the 32-mesh plastic screen.

FIG. 2.—"Sleeve cages" of this type were used to enclose parts of test seedlings. Insect infested bolts as well as living insects were placed in such cages. The cage is made from 32-mesh plastic screen with muslin sleeves at each end.

fected trees were placed in cages that enclosed all or parts of 117 seedlings, and

b. Approximately 20,000 beetles reared in the laboratory from similar bolts (Fig. 3) were placed in cages on 87 seedlings.

2. a. Bolts, containing about 4,000 beetles, that had been impregnated under vacuum with a suspension of *C. fagacearum* were placed in cages on 6 seedlings, and

b. Approximately 1,700 beetles reared from similar bolts were placed in cages on 13 seedlings.

3. a. Bolts, containing about 8,000 beetles, from nondiseased trees were placed in cages on 10 seedlings, and

b. 1,000 beetles reared from similar bolts were placed in cages on 8 seedlings.

Oak wilt symptoms developed in 3 (all northern red oaks) of the 241 seedlings and *C. fagacearum* was isolated[5] from 2 of them. These 3 cases are described below.

Oak wilt symptoms were observed July 10, 1957, and *C. fagacearum* was isolated from 1 of the 117 seedlings fed upon by beetles that emerged from bolts placed in the cages. The bolts in this case came from a naturally infected black oak tree near Salem, Missouri that became heavily infested with barkbeetles after it was felled in August 1956. On September 20, 1956 the tree was cut into bolts some of which were taken to the nursery and placed immediately in a frame cage that enclosed the entire seedling. It is estimated that 900 beetles emerged and fed very heavily in twig crotches, bases of leaf petioles, and on the stem at rough spots in the bark. A few of the beetles may have emerged in the fall and early winter of 1956, but the vast majority emerged in April 1957. The cage was left over the tree from the time the bolts were put in it until symptoms were observed. By that time all of the beetles had emerged from the bolts and were dead.

[5]All cultures and identifications of the fungus were made by Dr. T. W. Bretz, professor of forestry (pathologist), University of Missouri School of Forestry, Columbia, Missouri.

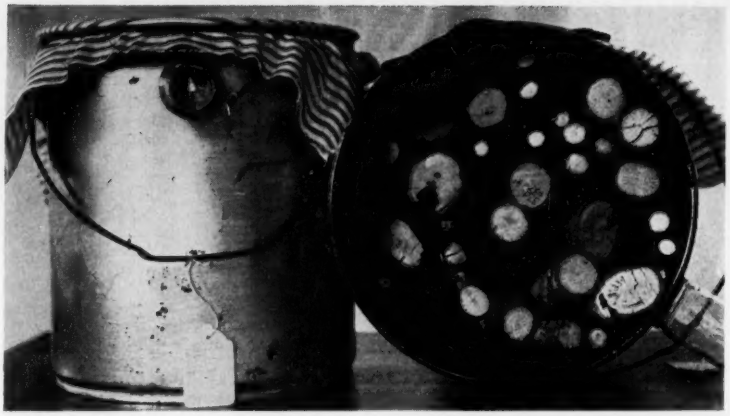

FIG. 3.—Containers used in the laboratory to rear the insects used in these tests. Infested bolts were placed in the containers and as the insects emerged they crawled into the glass bottles via holes in the cans. The insects were then transferred to cages on test trees.

Oak wilt symptoms were observed June 14, 1957 and *C. fagacearum* was isolated from 1 of the 87 seedlings fed upon by beetles reared in the laboratory from bolts from naturally infected trees. The bolts in this case came from black and scarlet oak (*Q. coccinea* Muenchh.) trees that were felled in October 1955, near Salem, Missouri. They were brought to Columbia and stored outside in a shaded place until March 1956, when they were transferred to a cold storage plant and held at 40° F. In early May 1956, they were put in rearing cans in the laboratory where the beetles emerged. On May 23, 1956 about 200 beetles were placed in a sleeve cage that enclosed the upper part of the stem. The beetles were dead when the cage was removed on June 14, 1956. However, they had made many injuries on the stem, particularly at rough spots in the bark at the bases of twigs.

Typical oak wilt symptoms were observed June 14, 1957 in 1 of 13 seedlings fed upon by 55 beetles that emerged in the laboratory from artificially impregnated bolts. However, the fungus could not be recovered from samples that were cultured at the laboratory. The beetles involved were caged on this seedling on May 29, 1956, and were dead when the cage was removed on June 19, 1956. Some feeding had occurred on the stem, but relatively few injuries were made on other parts of the seedling.

No oak wilt symptoms developed on trees fed upon by barkbeetles that emerged from impregnated bolts placed in the cages or from bolts from nondiseased trees. Also, no oak wilt symptoms developed in nursery trees that were not involved in oak wilt tests.

The number of beetles and the extent of injury per plant unit in the above tests were far greater than are normally found under field conditions. Feeding injuries were especially severe on trees where the beetles emerged from infested bolts put in the cages. This was to be expected because the average number of beetles that emerged was greater than the number placed directly into similar cages. Also, many of the beetles reared in the laboratory were damaged and most of them were reduced in vitality and were less active than those emerging from bolts in the cages.

The successful transmission of the oak wilt disease in these studies is evidence that the small oak barkbeetle may help in spreading the disease. These studies, and field observations, indicate that the percent of beetles that transmit the disease is infinitesimally small. If this were not so, the incidence of oak wilt would be much greater than it is now.

Deer Browse Production from Felled Trees in the Northern Hardwood-Hemlock Forest Type

J. H. Stoeckeler,[1] John M. Keener,[2] and R. O. Strothmann[1]

IN THE FORESTS of the Lake States region, comprising Wisconsin, Michigan, and Minnesota, it has long been noted that recent cuttings, particularly in the northern hardwood-hemlock forest in the winter months, often attract white-tailed deer (*Odocoileus virginianus borealis*). They browse on the tips of newly felled hardwoods, usually confining their feeding to the past season's growth. In conifers, particularly hemlock (*Tsuga canadensis*), the needles are eaten.

The browse provided in the northern hardwood-hemlock type, particularly by species such as sugar maple (*Acer saccharum*), red maple (*A. rubrum*), yellow birch (*Betula alleghaniensis*), basswood (*Tilia americana*), white ash (*Fraxinus americana*), and hemlock, is especially palatable. Studies on feeding of deer in pens, conducted by the Wisconsin Conservation Department at Ladysmith, Wisconsin, have shown that such browse has high nutrient value for deer, judging by their ability to keep in good physical condition for prolonged periods when fed about 4.5 pounds of the material per day per adult animal (*3*).

Most of the studies on deer browse evaluation to date have been with woody shrubs or with tree reproduction (*2*). However, Aldous (*1*) devised a curve for browse production in northern white-cedar (*Thuja occidentalis*). He found about 17 pounds of browse for a 4-inch tree, 46 pounds for an 8-inch tree, and 74 pounds for a 12-inch tree.

The purpose of the present study was to furnish an estimate of the amount of available deer browse produced, both per tree by species and on a per-acre basis, in commercial logging operations and in noncommercial thinnings. In addition, time and costs were studied in a noncommercial thinning made for the dual purpose of furnishing deer browse and accomplishing timber stand improvement.

Method of Study

The present study involved two different phases: (1) time studies on felling trees and lopping the tops to provide supplemental browse for deer and at the same time accomplish stand improvement, and (2) an evaluation of the amount of deer browse by weight provided in felled trees of different diameters and species.

One time study was made in the winter of 1952-1953 in a sapling-sized (range 1 to 5 inches d.b.h.) stand of northern hardwoods on the Argonne District of the Nicolet National Forest. The cutters selected about 100 crop trees per acre at a spacing of about 20 by 20 feet and thinned all competing trees within a radius of about 5 feet of the selected crop trees, which averaged 3.2 inches. Felling was done by a 2-man crew using axes. Browse production was evaluated in the same manner as described below in the larger study.

A second time study was run on eight 2.5-acre blocks of second-growth northern hardwood timber, ranging mostly from 3 to 8 inches in diameter, with occasional larger trees. The main stand was about 40 years old, and the scattered older trees were about 60 to 80 years old. There was no available market, so the operation was noncommercial, performed by local laborers hired by the day. Some additional trees were studied in a nearby sawlog stand of northern hardwood-hemlock to obtain data on larger trees.

Painted survey lines were run around the exterior boundaries of the eight 2.5-acre plots, and the trees were marked with a streak of yellow paint. The trees were tallied by species and diameter so that the amount of basal area subsequently cut was known.

Two different methods of stand treatment were tested. In one, only the worst of the cull and badly deformed trees were cut; in the other, culls were cut and in addition thinning was done around the individual trees of the more valuable species of better form that had prospects of making crop trees.

Several kinds of tools were tested. On six of the plots a 1-man power saw was used to fell the marked trees. One man ran the saw while a second man notched trees to be felled, and lopped the tops of branches of felled trees to bring practically all tops within reach of deer, i.e., within about 4 to 5 feet of the ground. On two plots the larger trees were felled with a 2-man handsaw and the smaller trees were cut with an ax.

Deer browse production was evaluated on the newly felled trees. For the hardwood species the new or current year's growth was considered as browse whereas in hemlock all of the needles were so considered.

Several techniques were used in the evaluation. For the smaller broadleaf trees, all the limbs were cut, sorted by position occupied in the crown of the tree, calipered at a point about 6 inches away from

[1]Research forester, Lake States Forest Experiment Station. The station is maintained at St. Paul 1, Minnesota, by the Forest Service, U. S. Department of Agriculture, in cooperation with the University of Minnesota. Credit is due Harold C. Bell of the Lake States Station for assistance in the browse evaluation and in the time study.

[2]Administrative assistant, Game Management Division, Wisconsin Conservation Department, Madison, Wisconsin.

FIG. 1.—*Left*, weighing hardwood limbs before and after removal of current year's growth to estimate production of deer browse; *Right*, a stand of second-growth hardwoods after felling for deer browse production and as a stand improvement measure.

the base of the cut (to avoid butt swell) and then weighed on a scale which could be read to the nearest half-ounce (Fig. 1). After each limb was weighed the new growth was clipped off and the branch reweighed. The difference in weight was the potential browse production for that limb. Some trees were also clipped to a diameter of 0.2 inch, the size selected as a basis for a separate evaluation of browse production under extremely heavy deer use.

The information recorded on the individual trees included a tree number, species, diameter at breast height, crown class, living crown length, total height of tree, number of 16-foot logs or 8-foot bolts, age of tree, crown size, and crown vigor.

After an evaluation of the individual limb data from some of the smaller trees of both broadleaved species and hemlock, a partial sampling scheme was devised for larger trees. This consisted of calipering the diameter of all limbs on the tree and classifying each limb into one of two classes, i.e., a top limb or a side limb. It was observed that top limbs often had longer, more vigorous new growth than side limbs. To some extent the same was true of all living needles on hemlock limbs.

Results in Sapling-Sized Northern Hardwoods

Costs.—In the study made in sapling-sized northern hardwoods, the browse production was measured by 100 percent clipping of new growth on the trees felled on seventeen 1/10-acre plots. On these plots an average of 418 trees per acre were felled at a cost of $9.03 per acre. The total browse produced was equivalent to 372 pounds per acre, or an average of 0.89 pound per tree felled. The browse produced in this operation cost $48.50 per ton of fresh browse. The labor cost $1.20 per hour.

Browse production.—The study on browse production obtained in sapling stands based on clipping of all the browse from 630 trees of seven broadleaf species revealed a high production of browse per square foot of basal area cut. It ranged from 24.6 pounds for quak-

TABLE 1.—BROWSE PRODUCTION PER TREE IN 1- TO 5-INCH SAPLING STANDS

Species	Average diameter of tree	Weight of fresh browse		Basis: trees
		Per tree	Per square foot of basal area	
	Inches	*Pounds*		*Number*
Paper birch	3.4	1.57	24.9	52
Sugar maple	2.2	.78	30.0	392
Red maple	2.1	.63	26.3	150
Quaking aspen	3.4	1.55	24.6	4
Northern red oak	2.9	2.15	46.7	13
Ironwood	2.6	1.04	28.1	14
Basswood	3.5	1.80	26.8	5

TABLE 2.—STAND DATA AND TIME STUDY ON TREE FELLING IN POLE AND SAWLOG-SIZE NORTHERN HARDWOOD STADS FOR DEER BROWSE PRODUCTION

Treatment	Tools used	Plot number	Basal area removed per acre	Time required per acre		Cost per acre
			Sq. ft.	*Man-hours*	*Saw-hours*	*Dollars*
Culls only felled	Hand saw	3	10.6	6.44	3.04	9.36
	Power saw	7	12.5	7.40	3.66	12.95
	Power saw	12	17.1	9.80	4.90	17.15
	Power saw	15	12.1	7.50	2.50	12.30
Total			52.3	31.14	14.10	51.76
Average			13.1	7.78	3.52	12.94
Culls felled and thinning done around crop trees	Hand saw	2	21.4	17.80	6.90	26.47
	Power saw	6	27.8	12.20	4.50	20.29
	Power saw	10	17.8	16.00	8.00	28.00
	Power saw	14	18.0	11.07	5.53	19.36
Total			85.0	57.07	24.93	94.12
Average			21.2	14.27	6.23	23.53

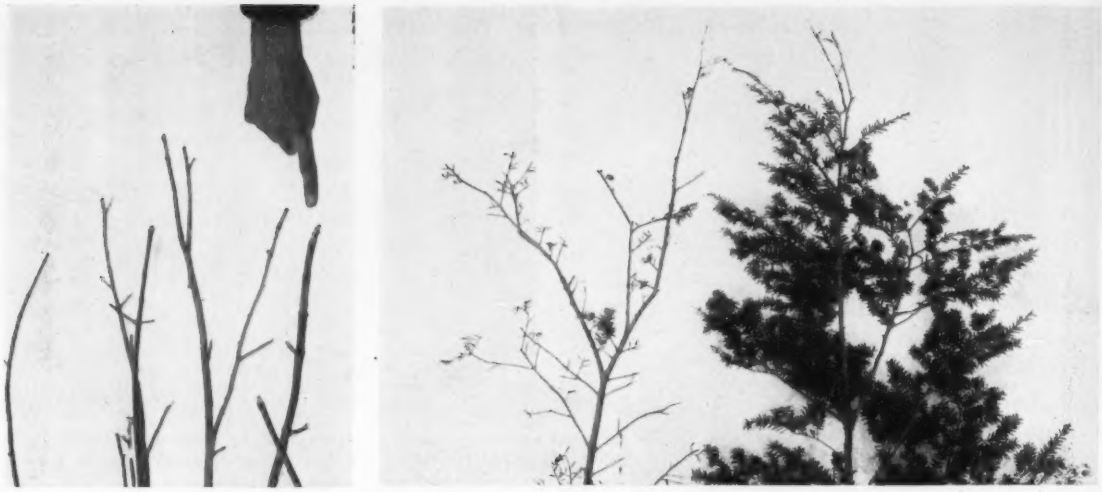

FIG. 2.—Types of browsing observed. *Left*, basswood showing considerable browsing of new growth by deer. *Right*, at left, hemlock branch virtually stripped of its needles by deer; right, a normal branch.

ing aspen (*Populus tremuloides*) to 46.7 pounds for northern red oak (*Quercus rubra*) (Table 1). These browse yields in young stands are noticeably higher than those given later on for older stands (Table 3).

Comparison with alfalfa hay.—The $48.50 per ton cost of browse cut in this operation in a sapling stand compares more than favorably with the cost of alfalfa hay delivered in winter deeryards, which has averaged $83 per ton. Such feeding with alfalfa has, on occasion, been resorted to in severe winters in Wisconsin. Ton for ton, the airdry alfalfa hay has an apparent advantage over the fresh browse in tops because of the approximately 50-percent moisture content of the browse (fresh weight basis). This, however, is offset by the observed waste of up to 50 percent of the alfalfa hay by trampling and burial in the snow and the regular rejection by the whitetail deer of the coarse stems, which constitute a substantial part of the weight of the alfalfa (*3*).

On the other hand, it has been repeatedly observed in the small-scale noncommercial thinnings made in sapling-sized stands of northern hardwoods that there can be 70 to 90 percent utilization of the total browse made available in the felled trees (Fig. 2). Furthermore, tree cutting as a method of feeding deer has an advantage in that it is possible to disperse the cutting over a wider area of deer range, including portions which are inaccessible to vehicles used to bring in baled alfalfa hay.

A Study in Pole- and Sawlog-Sized Trees

Time and cost aspects.—In the four plots on the 20-acre experimental block of pole-sized timber where only culls were removed, the amount of basal area cut ranged from about 11 to 17 square feet per acre and averaged 13 square feet. The cutting was considerably heavier in the areas where both thinning and cull removal were done, averaging about 21 square feet per acre (Table 2).

The cost of doing the work averaged $12.94 per acre in the cull removal area and $23.53 per acre on cull removal with crop tree thinning (Table 2). This is equivalent to $0.99 and $1.11 respectively per square foot of basal area.

When adjusted for basal area the power saw had a slight advantage over the hand saw in the ratio of $1.05 to $1.12 per square foot of basal area felled and lopped, or a 7-cent advantage for the power saw. Labor was paid at the rate of $1.47 to $1.53 per hour, the 1-man power saw was rented at 50 cents per hour, and the hand saw had an arbitrary charge put on it of 10 cents per day. The chief advantage of the power saw was that a small crew could cover more ground in the same length of time.

The marking time on the job ranged from 0.48 to 0.79 man-hour per acre, being lower on the cull removal area than on the thinning plus cull removal area. In addi-

TABLE 3.—BROWSE PRODUCTION IN SIX SPECIES IN POLE- AND SAWLOG-SIZE NORTHERN HARDWOODS STANDS ON SEVERAL COMPARABLE BASES[1]

Species	Average fresh weight of browse				Basis: trees
	Per square foot of basal area of main stem	Per square foot of basal area of limbs			
		Top limbs	Side limbs	Ratio	
	Pounds				*Number*
Red maple	10.0	31.9	17.3	1.84	5
Sugar maple	10.9	24.1	18.5	1.30	11
Basswood	11.9	20.1	12.5	1.61	6
Yellow birch	15.8	30.9	19.4	1.59	8
White ash	18.7	29.5	7.8	3.78	4
Hemlock	116.7	249.5	185.6	1.34	11

[1]For northern hardwoods, only the past season's growth was clipped. In hemlock, all green needles were stripped.

tion $7.36 worth of paint (8 quarts) was required for the 20 acres.

Browse production.—As felling proceeded on the area, certain trees were selected for evaluation of browse production as already described under "Methods of Study."

After the browse production was calculated for each of 45 trees, browse weight was plotted over d.b.h. for each of the species. The trends for separate species were such that the data could be combined for five broadleaf species. Hemlock was kept separate because of much higher browse production than for hardwood trees of comparable size. Hemlock was similar in browse production to northern white-cedar (*Thuja occidentalis*) as reported by Aldous (*1*).

The combined data for broadleaf species, including that from some larger trees on a nearby tract, showed about 2 pounds of browse produced for a 5-inch tree, 8 pounds for a 10-inch tree, 17 pounds for a 15-inch tree, and 28 pounds for a 20-inch tree (Fig. 3).

Hemlock had a high production of browse in the form of needles. A 5-inch tree provided about 24 pounds of browse, a 10-inch tree 76 pounds, and a 15-inch tree 150 pounds (Fig. 4).

The values given in Table 3 are rather conservative estimates for hardwoods because only the past season's growth was included. Deer sometimes clip off and eat some of the 2- or 3-year-old wood on species like sugar and red maples, yellow birch, or slower growing basswood (*Tilia americana*) and oak, often taking these down to a diameter of around 0.2 inch.

Clippings of eight separate top limbs of hardwoods showed that there were 2.77 times as much total fresh weight of browse produced when clipped to 0.2-inch diameter as when only annual growth was clipped. For five side limbs, browse production was 2.4 times as high when cut to 0.2-inch diameter as when only annual growth was clipped. Thus, roughly, there is a conversion factor of about 2.5 for calculation of maximum possible browse production from the hardwoods in a situation where deer concentration is high and they become hungry enough to eat some of the larger, coarser material.

When the browse data were analyzed by shade tolerance, two entirely different trends were revealed (Table 4). In the tolerant maples, the smaller diameter trees evaluated for browse showed a markedly higher production than larger trees on a comparable basal area. For the intolerant or moderately tolerant species, the trend was reversed. The reversal is due to the fact that the small-diameter trees in the less tolerant group include some intermediate or weak codominants which were of somewhat lower vigor than the larger, more vigorously growing dominant trees. The tolerant maples, on the other hand, had rather good vigor and elongation of new growth, even on the smaller diameter trees which were only of intermediate or codominant crown class.

For all 34 hardwood trees combined production of browse per square foot of basal area was higher in trees of 4- to 8-inch class than in larger trees. For instance,

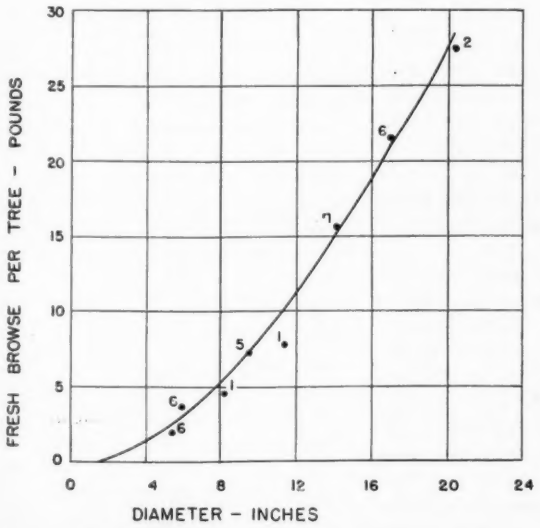

FIG. 3.—Browse production per tree in 34 trees of second-growth northern hardwoods. Values on graph represent number of trees.

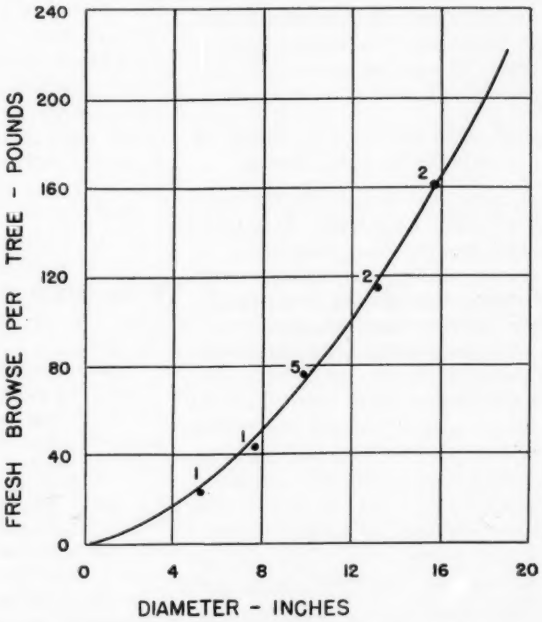

FIG. 4.—Browse production (needles) in 11 hemlock trees. Values on graph represent number of trees.

TABLE 4.—COMPARATIVE BROWSE PRODUCTION IN TOLERANT SUGAR AND RED MAPLES AND IN THE RATHER INTOLERANT OR ONLY MODERATELY TOLERANT YELLOW BIRCH, WHITE ASH, AND BASSWOOD

Diameter at breast height	Browse per square foot of basal area		
	Sugar and red maples	Yellow birch, white ash, and basswood	All species combined
Inches	*Pounds*		
4	29.4	11.5	17.8
6	21.9	12.0	16.5
8	17.9	12.7	15.5
10	15.1	13.5	14.6
12	12.8	14.5	14.1
14	10.9	15.4	13.6
16	9.1	16.2	13.2
18	7.8	17.1	12.9
20	6.4	18.0	12.6

for 4-inch trees it was 17.8 pounds per square foot, for 12-inch trees it was 14.1 pounds, and for a 20-inch tree it was 12.6 pounds (Table 4).

No particular relationship was noted in hemlock as to the effect of tree diameter on browse production per square foot of basal area.

The data were also analyzed on the basis of browse production per thousand gross board feet cut and per gross cord cut. They showed averages of 121 and 1,507 pounds of fresh browse produced per thousand board feet of hardwoods and hemlock respectively. Per standard cord of material usually cruised as pulpwood, the browse production is 80 and 929 pounds per acre respectively.

Calculated Browse Production on Nicolet National Forest

Using the current browse data, a calculation was made of the probable deer browse production by regular timber sale operations for larger tracts of land in the northern hardwood-hemlock type.

In the Nicolet National Forest located in northeastern Wisconsin, some 2,925 acres of this type were cut as part of the regular timber sale activity in the fiscal year 1954. This cutting is done on a sustained yield basis; that is, about that same acreage (or timber volume) is cut every year. The average volume cut was 1,400 board feet per acre, of which about 10 percent was hemlock. On this basis the annual browse production in this National Forest is roughly 360 pounds per acre, yielding some 1.053 million pounds, or around 526 tons per year.

This amount of browse could, in theory, meet half the nutrient requirements of 5,850 deer for an 80-day winter period in January to late March, which is generally a crucial period as regards available food for deer.[3]

The browse is a cost-free byproduct of logging. In contrast to the $83 per ton cost of alfalfa hay laid down in deer-yards, logging browse does not cost the taxpayer or sportsman a cent. Furthermore, in all such cutting areas there is a considerable stimulation of browse for a period of several years in the form of new sprout growth and accelerated growth, of existing natural reproduction, much of which may end up as deer browse. Of course, all of this browse is not consumed. Often more browse is produced in a rather concentrated timber sale area than the deer can possibly consume. Also, some loss occurs in those portions of recently felled browse either buried below snow line or above the reach of the deer.

However, it has been observed that on occasion as much as 70 to 90 percent of all available newly felled browse in smaller timber sale or cutting areas is utilized. For instance, in the small cutting study of 20 acres referred to in this paper as many as 27 deer were seen at one time.

A word of warning is in order regarding the sustained productivity of this northern hardwood-hemlock forest in terms of its ability to withstand repeated cutting and heavy browsing of reproduction at 10-year cutting cycle intervals. The basic silvicultural principle involved here is the assumption that these stands will become or will retain their uneven-aged status; that is, have a range of sizes all the way from 1-inch to 24-inch-diameter trees. This, of necessity, means that a reasonably good proportion of the seedlings now only knee high must eventually grow into sapling sizes (1- to 5-inch trees).

Where there is an overpopulation of deer, the seedlings are so badly abused and misshapen by overbrowsing that very few of them get into the sapling stage (*4*). If overbrowsing is continued, the sustained-yield, uneven-aged forest will be jeopardized and the deer browse production potential reduced.

The obvious conclusion is that there must be a controlled harvest of the deer herd, having as its base the long-term carrying capacity of the deer range balanced with the requirements of timber management.

Summary and Conclusions

1. A study was made of the production of potential deer browse in newly felled trees in the northern hardwood-hemlock forest type in northeastern Wisconsin. Such browse is important as supplemental food for deer, as they find it in timber sale areas and in noncommercial thinnings made during the critical winter months.

2. The study procedure consisted of clipping the previous season's growth on hardwoods and stripping the needles of hemlock.

3. On the basis of fresh browse yield per square foot of basal area (that is, cross-sectional area in square feet at breast height), the northern hardwoods such as sugar maple, red maple, yellow birch, basswood, and white ash in pole- and sawlog-size stands produced an average of about 13 pounds of

[3] Based on a daily consumption of 4.5 pounds of fresh browse, which will readily support the average deer for one day without appreciable weight losses for a prolonged period (*3*).

fresh browse and hemlock 117 pounds per square foot of basal area. A moderately dense stand of second-growth hardwood-hemlock often contains 90 square feet of basal area of hardwoods and 10 feet of hemlock. Its total browse potential, then, is around 2,340 pounds per acre for such a stand if clearcut. Older stands, or those with 20 to 30 percent of hemlock, may have several tons per acre.

4. The browse production per thousand board feet of gross volume of sawlogs cut amounted to 121 and 1,507 pounds for hardwoods and hemlock respectively.

5. Per standard 4x4x8-foot cord, the browse production for 5- to 9-inch-diameter classes inclusive was 80 and 929 pounds for hardwoods and hemlock respectively.

6. On the average Nicolet National Forest timber sale in northern hardwood-hemlock type, where only about 20 percent of the total basal area or volume on the stand is cut, comprising an average of 1,400 board feet per acre of which around 10 percent is hemlock, the browse produced per acre was calculated as about 360 pounds, fresh weight.

7. The total browse production in the 2,925 acres of this type cut on this forest in a recent sample year is estimated at 526 tons per year, theoretically equal to one-half the entire nutrient need of 5,850 deer for an 80-day winter period when the natural food supply is at a minimum.

8. In young hardwood stands of 1- to 5-inch-diameter class the amount of fresh browse per square foot of basal area ranges from 26.3 to 46.2 pounds. Aspen averaged 24.2 pounds. On a per-acre basis, where 418 northern hardwood or aspen trees were felled in thinning, the per-acre volume of the fresh browse was 372 pounds.

9. In stands of larger diameter, hardwoods in the 10- to 20-inch diameter class provided 15.1 to 6.4 pounds of browse per square foot of basal area for sugar and red maples and 13.5 to 18.0 pounds for yellow birch, white ash, and basswood combined.

10. Sustained yield forestry with annual timber cutting on large forest properties is an important factor in the over-winter survival of the deer herd due to supplemental feed provided in the newly felled tops and later in the sprouts and new seedlings stimulated by logging.

Literature Cited

1. ALDOUS, SHALER E. 1941. Deer management suggestions for northern white-cedar types. Jour. Wildl. Mgmt. 5(1): 90-94.
2. ————. 1952. Deer browse clipping study in the Lake States region. Jour. Wildl. Mgmt. 16(4): 401-409.
3. DAHLBERG, BURTON L., and RALPH C. GUETTINGER. 1956. The white-tailed deer in Wisconsin. Wis. Cons. Dept. Tech. Wildl. Bul. 14: 282 pp.
4. STOECKELER, J. H., R. O. STROTHMANN, and L. W. KREFTING. 1957. Effect of deer browsing on reproduction in northern hardwood-hemlock type in northeastern Wisconsin. Jour. Wildl. Mgmt. 21(1): 75-80.

Cruiser's "Horse" a Variation of the Biltmore Stick

An elderly lumberman, in whose company I once examined a tract of timber, offered me the use of a horse. But the "horse" he provided was a straight shaft of hickory 3½ feet long and ¾ of an inch in diameter, in short, a good stout cane. For himself he brought out a similar stick, which, however, had a curved end not unlike a shepherd's crook. He said this sort of a "horse" was especially useful when working up-hill or over rough ground. The joke was on me, but I watched with some interest to see how he proposed to ride this hobby.

We entered presently a portion of timber where the terrain became exceedingly steep and rocky. Here, from time to time, he would reverse his hold on the staff, and with the hooked end reach for a bush, small tree or edge of a rock ledge, and pull himself upward and forward with a minimum of effort and without much change of pace.

I happen to be an active forester and have never depended on a cane. But this kind of staff impressed me as a good device for conserving energy on steep ground.

Quite recently a new idea came to me. I measured off on my favorite "horse" the inch diameter spaces of a standard Biltmore stick, and notched these on the staff.

Then I went a step further and improvised a hook on the lower or ground end of the staff for pulling myself up-hill. On my first rough model I used an angular section of seasoned birch and fastened it securely with screws. The finished piece looks something like a yeoman's arrow "a cloth yard long" such as was used with the English long bow.

This may cause many a young forester to smile. Yet how often have I seen a rugged forester using his Biltmore stick for a cane at the end of a long day's cruise. Perhaps the manufacturers of these useful implements have observed the same thing, for they install brass mountings at both ends of the stick. It is also well known that foresters in Europe, while engaged in release cutting and weeding, often carry a stout cane in the left hand to ease strain on the back muscles, while they swing a sickle or pruning hook with the right hand.

After long experience a cruiser may come to depend less and less on a scaling stick to obtain the d.b.h. of his timber trees. But he usually carries the stick and makes frequent checks for accuracy.

Personally I prefer a 4 foot staff, in spite of the fact that a 3 foot staff is more easily held against the tree. For climbing purposes up a steep grade the longer staff is far superior. On up-hill work the hook on the lower end enables the user to outdistance more vigorous climbers who have no horse.

JAMES R. SIMMONS
Consulting forester,
Bel Air, Md.

Age of Rough (Ground Cover) Affects Shortleaf Pine Establishment and Survival

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Southern Forest Experiment Station,[1]
Forest Service, U. S. Department
of Agriculture

SUCCESSFUL ESTABLISHMENT of natural pine reproduction depends to a large extent on the condition of the seedbed at the time of seedfall. Although many investigators have reported improved germination as a result of disturbance of the forest floor, there is little information on lasting effects of the disturbance. Studies of prescribed burning begun in 1952 on the Austin Experimental Forest, near Nacogdoches, Texas, provided an opportunity to compare germination, establishment, and survival of pine seedlings on plots burned at different seasons of the year and at various intervals before seedfall.

Study Area

In general, the area supported an immature sawlog stand of shortleaf and loblolly pines (*Pinus echinata* Mill., *P. taeda* L.) mixed with hardwoods. The stands also contained occasional overmature pines. Pine reproduction was scanty and on some plots almost entirely lacking. Sapling and pole-size hardwoods, primarily sweetgum (*Liquidambar styraciflua* L.), post oak (*Quercus stellata* Wangenh.), and red oak (*Q. falcata* Michx.), predominated in the understory. Prior to treatment the average stand per acre consisted of 237 pine stems with a basal area of 44 square feet, plus 1,028 hardwood stems with a basal area of 63 square feet.

Litter depths prior to burning varied from 0.2 inch under hardwood clumps to 1.5 inches under large pines. Grasses and weeds were sparse both before and after burning. In general, fuel was light and probably typical of average pine-hardwood upland stands in east Texas.

Prescribed burns were made in early winter, late winter, spring, and late summer. The first burn was in May 1952 and the last in September 1955. Thus the interval before seedfall ranged from 3 to 43 months.

The older burns were backfires and the later ones were headfires. Seedbeds produced by the two kinds of fire were quite similar—season of burn affected seedbeds much more than type of burn.

Burning was planned to get a reasonably uniform hot fire, but under conditions that would preclude an extremely severe fire. On most of the plots, mineral soil was not uniformly exposed; an average of ¼- to ½-inch of unconsumed litter remained after the fires.

Experimental Procedures

Of the 27 plots, some were one acre and some one-half acre in size. Three ¼-milacre paperboard seed traps were systematically located on each plot, as were nine milacre quadrats. Pine seeds were counted in January 1956. Freshly germinated seedlings were tallied in late April and early May. Nine well-distributed seedlings on each quadrat or nearby were marked with wire pins.

On July 3, the condition of the pinned seedlings were noted. Practically no unpinned seedlings were found on the milacres at this time, indicating that few seeds germinated after early May.

In early September the pinned seedlings were again examined and the heights of the surviving ones were measured.

Precipitation during the study was low, only 3 of the 10 months having normal rainfall. During

[1]East Texas Research Center, maintained in cooperation with Stephen F. Austin State College, Nacogdoches, Texas.

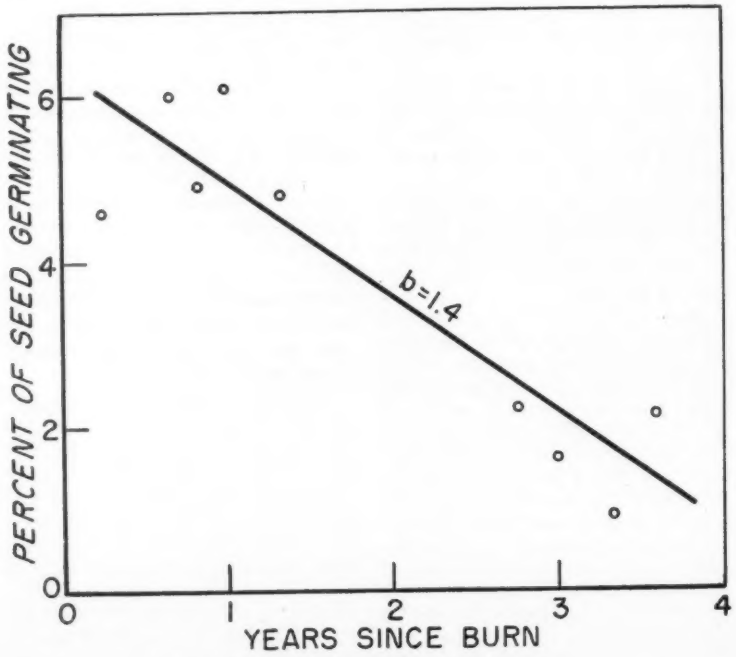

FIG. 1.—Seed germination by years since burn.

December and January there were 44 consecutive rainless days. In late February and early March there was one 15-day period without rain. In August, no rain fell for 25 successive days, while temperatures exceeded 100°F on all but six of these days. September was another dry month, with some 28 rainless days.

Results

This paper offers data on seedfall, germination, establishment, and survival of seedlings in a single year of predominantly adverse weather. Most of the cone-bearing trees were shortleaf (1955 was a poor seed year for loblolly in the vicinity), and this is essentially a study of a better-than-average shortleaf seed crop.

The December-January drought delayed germination and greatly prolonged the period of exposure to birds and rodents. The shorter dry spells during the early spring probably killed many late-germinating seedlings that had not become adequately rooted.

Seedfall.—On individual plots seedfall ranged from 183,000 to 779,000 seeds per acre. The average was 455,000. There were no statistically significant differences between the averages of the seedfall for the various dates of burn.

Germination.—Germination was quite low, the average for all plots being 3.7 percent. Differences in germination percent between dates of burning were highly significant. The mean percentages for the various dates varied from 0.9 to 6.1.

The regression of germination percent on years since burn (Fig. 1) was highly significant. The equation $Y = 6.3 - 1.4X$ indicates that, with each additional year (X) between burning and seedfall, germination (Y) was reduced by roughly 1.4 percent. Thus for the test plots, where total available seed averaged 455,000 per acre, each year reduced the initial stocking by some 6,350 seedlings per acre, or almost one-fourth of the seedling catch.

The small but highly significant differences in germination are believed to reflect primarily differences in accessibility of seedling roots to moisture. Except on the most recent burns, regrowth and leaf fall probably afforded some protection against seed-eating rodents and birds. Excessive consumption of seed by such predators may be the reason for the relatively low germination on the 3-month-old burn. Since all burns left about the same depth of fine litter, it is inferred that germination was hindered in proportion to the depth of litter accumulated since burning. It is also possible that, on the older burns, plant roots aggravated moisture deficiency by reinvading areas from which small stems had been removed by the fire.

Establishment.—Seedlings alive on July 3 were considered established. There were no significant correlations between the various dates of burning and the proportion of pinned seedlings living in July, although the range of establishment was from 51 to 77 percent (Table 1).

Whether the losses were due to lack of moisture or to other causes is unknown. While May rainfall was deficient, it was fairly well distributed and was followed by heavy rains in June. In neither month were there prolonged excessive temperatures. Evidently none of the burns markedly favored survival during this rather mild establishment period.

Survival.—By the time the study was terminated in late September the seedlings had been subjected to very severe moisture stress. Surviving seedlings averaged from 2.3 to 3.2 inches tall on the variously burned treatments. It is believed that differences in survival were due to factors which affected the moisture available to the seedlings.

Tree percent after one growing season averaged 0.57 for all plots and ranged from 0.1 to 1.7. It thus compared quite favorably with the loblolly pine tree percent of 0.3 to 1.3 reported by Jemison and Korstian.[2]

Although survival of pinned seedlings showed highly significant variations with date of burn, there was no significant linear relationship with time since burning. The significance was due to differences between the dormant-season burns and growing-season burns.

The higher survival on growing-season burns probably reflects the superiority of these burns in killing competing vegetation. The results seem to indicate that at least part of this release remained effective after 43 months.

TABLE 1.—PROPORTION OF SEEDFALL GERMINATING AND SURVIVAL OF PINNED SEEDLINGS, BY MONTHS SINCE BURN

Months between burn and seedfall	Germination	Living seedlings[1]	
	May	July	September
	Percent		
3[2]	4.6	56	7
8	6.0	77	27
10[2]	4.9	56	9
12[2]	6.1	57	11
16	4.8	72	27
33	2.2	55	15
36[2]	1.6	51	7
40	.9	64	15
43	2.1	53	15

[1]A total of 243 seedlings were pinned in each burning treatment.
[2]Dormant-season burns.

Summary

In the upland pine-hardwood type of east Texas, prescribed burns were made at four times of the year and at intervals of 3 to 43 months prior to the heavy shortleaf pine seed year of 1955. Measurements of seedling development indicated that:

With a better than average shortleaf seed crop, followed by a droughty winter, germination averaged only 3.7 percent.

Germination percent was reduced by about 1.4 percentage points for each year elapsing between burning and seedfall.

By early July, survival was similar, although fairly low, on all treatments.

At the end of an adverse season there were differences in survival that indicated the superiority of growing-season fires over dormant-season burns.

[2]Jemison, G. M., and C. F. Korstian. Loblolly pine seed production and dispersal. Jour. Forestry 42:734-741. 1944.

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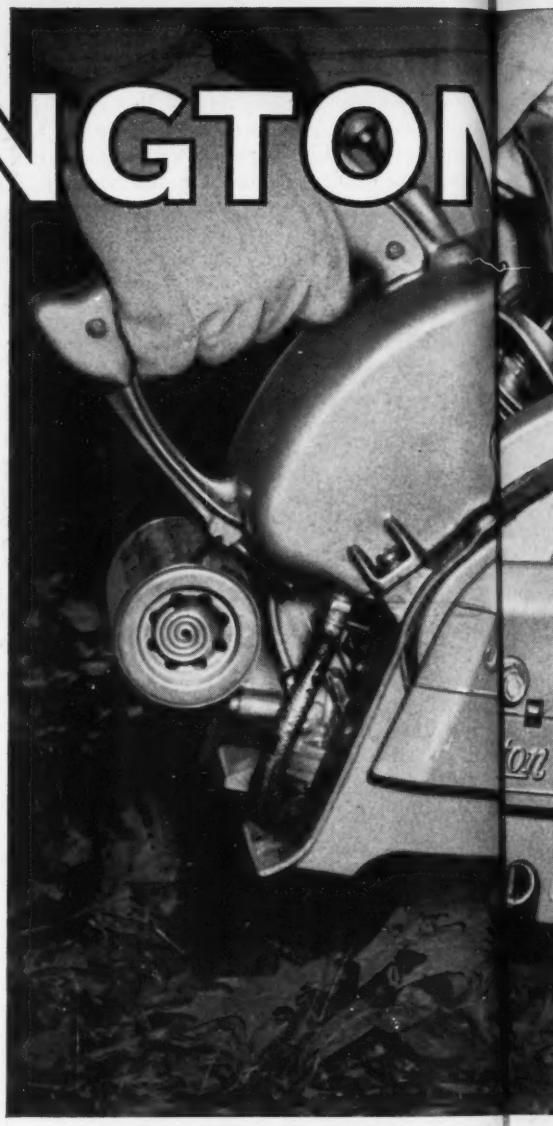

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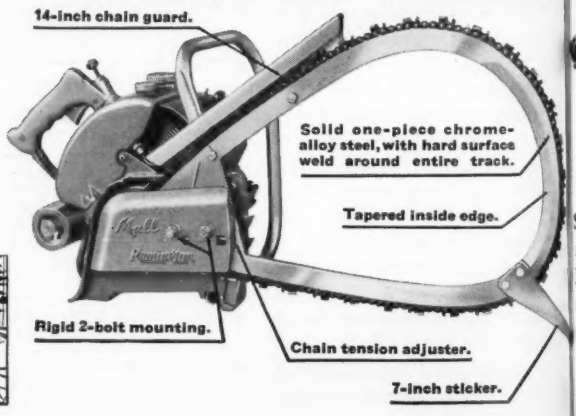
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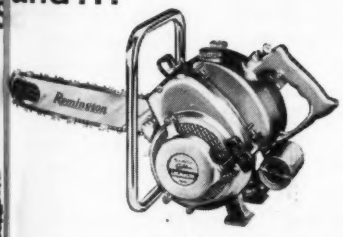

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Propagation of Several Species of Acer by Cuttings[1]

L. J. Enright
University of Maryland, College Park

COGGESHALL (*1*), DORAN (*4*), and SNOW (*9*) reported favorable rooting responses of stem cuttings of a number of maple species and varieties to various chemical treatments. In general, the most satisfactory results were obtained with softwood cuttings. Other experimenters (*2, 3, 6, 7, 8*) have been successful in rooting hardwood cuttings, but in almost every case the percentages of cuttings rooted were rather low and the period of time required for root initiation was lengthy. Enright *(5)* reported successful results in rooting the difficult yellow-poplar with concentrated-solution-dip treatments of indolebutyric acid. This study was undertaken to try *(1)* to broaden the period in which cuttings could be taken for successful propagation, *(2)* to increase the percentages of cuttings rooted, and *(3)* to reduce the period of time required for the root development.

Materials and Methods

Doran *(4)* observed that cuttings which rooted best did not come from the most vigorously growing trees. Also, he pointed out that cuttings taken from the lower branches, often more shaded, rooted better than those taken from the upper branches. For these reasons, the cuttings used in this investigation were taken from codominant rather than dominant trees in an area, and from the lower branches of those trees. All trees used as a source for cuttings were 25 years old, or older.

It is a generally accepted fact that the use of mist is an important aid in the propagation of plants by cuttings. In this work, it was decided to combine the use of a mist watering system with concentrated-solution-dip treatments of indolebutyric acid in an investigation to determine the proper time for making the cuttings and the treatments necessary for initiating greater percentages of roots on cuttings of 8 species of the genus Acer. The study was conducted for a period of 12 months.

The cuttings were taken from lateral twigs of the current season's growth and cut to a length of 6 to 8 inches, except in the case of *Acer palmatum*. Because of the nature of this plant the cuttings used were 3 to 4 inches long. All cuttings were taken from the same parent plants for the duration of the study to avoid genetic differences in the woody material used. A wound was made on two sides of the cuttings at the base by removing a thin 2 inch slice of bark in order to expose the cambium immediately before treatment. In each test, 50 cuttings were used and their basal portions were dipped to a depth of 2 inches, for a period of 5 seconds, into a solution of indolebutyric acid and distilled water. The indolebutyric acid solutions were made by dissolving the acid crystals in just enough 90 percent ethyl alcohol to cover them completely. Then, distilled water was added to obtain the desired volume. The dip concentrations used were 5 mg/ml, 10 mg/ml, and 20 mg/ml indolebutyric acid. A well drained greenhouse bench with an intermittent-low-pressure-mist system was used for the propagation. The mist system consisted of an in-bench installation with deflection type nozzles as described by Snyder *(10)* and it was timed to spray the plants for 6 seconds during every 10-minute interval from dawn until one hour after sunset. A coarse grade of bank sand was used as the propagation medium. Soil heating cables were used to maintain the rooting medium temperature at approximately 70 degrees F during the cold periods of the year. Whenever possible, air temperatures were maintained at a minimum of 72 degrees F during the day and 62 degrees F at night. No shade was provided on the greenhouse during this investigation. Cuttings were taken in February and at 4 week intervals after that for a period of 12 months. Beginning with the third week after the cuttings were put in the greenhouse bench, they were examined for root development at 2 week intervals. A cutting was considered rooted if it had one root at least one inch long. Rooting responses of the Acer cuttings are summarized in Table 1.

Results and Discussion

Acer campestre.—Treatments of 10 mg/ml and 20 mg/ml IBA initiated roots on *Acer campestre* cuttings if they were taken in May, June, and July. In this case roots were initiated on a species notoriously difficult to propagate vegetatively. The roots, however, were very small. Roots developed in a period of 37 to 42 days.

Acer ginnala.—Although it is generally considered unwise to attempt to root woody cuttings of *Acer ginnala* until softwood has been produced, cuttings of the Amur maple were successfully rooted when taken in February, March, April, May, June, July, August, September, and October. None of the plants used in the check callused or rooted. Cuttings taken in April, May, June, and July were rooted prolifically with treatments of 20 mg/ml IBA. The cuttings taken in these 4 months were rooted one hundred percent.

Acer griseum. — Cuttings were rooted but the results were not as pronounced as they were with the other species used in this investigation. Only those cuttings taken

[1]Scientific Article No. A642. Contribution No. 2827 of the Maryland Agricultural Experiment Station (Department of Horticulture).

TABLE 1.—THE ROOTING RESPONSE OF 8 SPECIES OF ACER TO INDOLEBUTYRIC ACID AS EXPRESSED BY THE NUMBER OF DAYS REQUIRED FOR ROOTING AND THE PERCENTAGE OF ROOTING (50 CUTTINGS PER TREATMENT)

	Acer campestre		*Acer ginnala*		*Acer griseum*		*Acer palmatum*		*Acer platanoides*		*Acer rubrum*		*Acer saccharinum*		*Acer saccharum*	
Treatment	Days to root	% rooted	Days to root	% rooted	Days to root	% rooted	Days to root	% rooted	Days to root	% rooted	Days to root	% rooted	Days to root	% rooted	Days to root	% rooted
February																
Check																
5 mg/ml																
10 mg/ml			37	14												
20 mg/ml			37	24												
March																
Check																
5 mg/ml																
10 mg/ml																
20 mg/ml			39	18							59	16				
April																
Check																
5 mg/ml			32	2												
10 mg/ml			32	76									41	20		
20 mg/ml			32	100	79	8	48	46			56	26	41	82	50	42
May																
Check			28	8												
5 mg/ml			28	8												
10 mg/ml	42	12	28	88			47	54	53	28			40	28	48	12
20 mg/ml	42	30	28	100	70	18	47	86	53	82	51	78	40	86	48	66
June																
Check			22	6												
5 mg/ml			22	14												
10 mg/ml	37	44	22	92			39	58	49	32			36	30	44	78
20 mg/ml	37	60	22	100	37	30	39	88	49	88	45	90	36	92	44	90
July																
Check			22	6												
5 mg/ml			22	16												
10 mg/ml	38	42	22	80												
20 mg/ml	38	62	22	100	38	42	42	22			54	76			49	72
August																
Check			26	2												
5 mg/ml			26	8												
10 mg/ml			26	16												
20 mg/ml			26	66												
September																
Check																
5 mg/ml																
10 mg/ml																
20 mg/ml			36	14												
October																
Check																
5 mg/ml																
10 mg/ml																
20 mg/ml			36	14												

in April, May, June and July responded, and then only to treatments with 20 mg/ml IBA. Approximately 90 days were required for the treatment to stimulate root growth.

Acer palmatum.—Cuttings taken during the period from April to July were rooted after treatment with 20 mg/ml IBA. However, the best percentages were obtained with the May and June cuttings. The 10 mg/ml IBA treatments stimulated roots in May and June also, but the response was not so great as that which resulted from the more concentrated solution treatment. The cuttings rooted by the 20 mg/ml IBA treatment had roots approximately the same length as the portion of the plant above the rooting medium. The Japanese maple cuttings rooted in a period of 39 to 48 days.

Acer platanoides.—The Norway maple was rather resistant to chemical stimulation but roots were initiated from material collected in May and June. Roots were present only on those cuttings dipped in the 10 mg/ml and the 20 mg/ml IBA solutions. The most concentrated solution produced three times as many rooted cuttings as the less concentrated solution in a period of approximately 51 days.

Acer rubrum.—It was not possible to stimulate root development in *Acer rubrum* cuttings with any treatment other than the 20 mg/ml IBA. Cuttings taken in March and April were rooted but not as well as those taken in May, June, and July. The earlier cuttings, those of March and April, had 5 or 6 roots per plant and these roots were approximately 1½ inches long. The cuttings rooted with success in the later months had 9 to 11 roots with an average length of about 2¼ inches. The cuttings taken in June

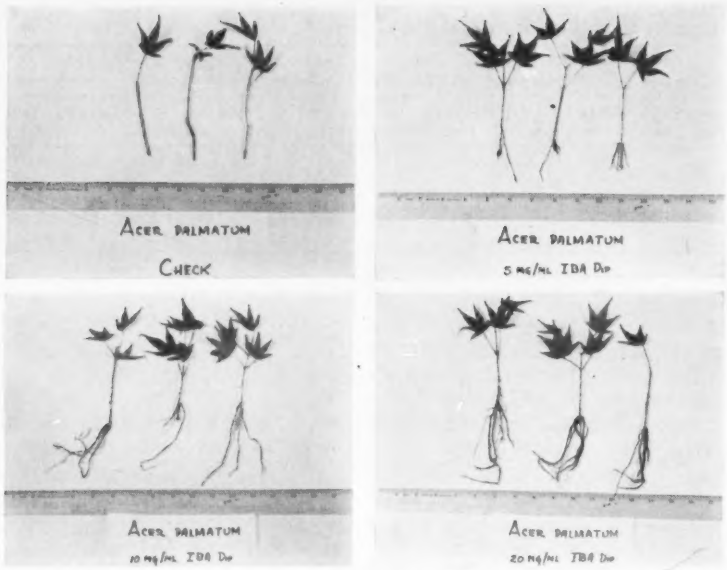

FIG. 1.—Rooting responses of *Acer palmatum* to various concentrations of indolebutyric acid.

rooted in 45 days, however; approximately 50 to 59 days were needed for the cuttings made in the other months.

Acer saccharinum.—This study showed April, May, and June to be the most satisfactory months for taking cuttings of silver maple. As in the other cases, the 20 mg/ml IBA treatment gave the best results. Approximately 40 days were required for the root development.

Acer saccharum.—It was possible to root cuttings of sugar maple with the 10 mg/ml IBA treatment when the cuttings were taken in April, May, June, and July, but again the best results were those from cuttings dipped in the 20 mg/ml IBA solution. The 90 percent rooting response with cuttings taken in June and the 92 percent success with cuttings taken in July may indicate a treatment of value for propagating outstanding sugar producing trees in the New England area.

Figure 1 shows rooting responses of *Acer palmatum* which is typical of all those described in this investigation.

Summary

This investigation indicates that concentrated solutions of indolebutyric acid aid in stimulating root development with the 8 species of Acer used. Results of this study show the following improvements over other methods and techniques (*4, 6, 9*) for vegetative propogation of maples:

1. An increase in the percentage of cuttings rooted.
2. A reduction in the number of days required for rooting the cuttings.
3. Greater length and density of the root systems produced.
4. A longer period of time during which the cuttings may be propagated.

Literature Cited

1. COGGESHALL, R. 1957. The propagation of Asiatic maples. Amer. Nurseryman, May 1:9-10.
2. COOPER, W. C. 1944. The concentrated solution dip method of treating cuttings with growth substances. Proc. Amer. Soc. Hort. Sci. 44:533-541.
3. CHADWICK, L. C., and D. C. KIPLINGER. 1939. The effect of synthetic growth substances on the rooting and subsequent growth of ornamental plants. Proc. Amer. Soc. Hort. Sci. 36:809-816.
4. DORAN, W. L. 1941. The propagation of some trees and shrubs by cuttings. Mass. Agric. Expt. Sta. Bul. 382. 56 pp.
5. ENRIGHT, L. J. 1957. Vegetative propagation of Liriodendron tulipifera. Jour. Forestry 55:892-893.
6. EDGERTON, L. J. 1944. Two factors affecting rooting of red maple cuttings. Jour. Forestry 42:678-679.
7. HITCHCOCK, A. E., and P. W. ZIMMERMAN. 1936. Effect of growth substances on the rooting response of cuttings. Contr. Boyce Thompson Inst. 8:63-79.
8. HITCHCOCK, H. E., and P. W. ZIMMERMAN. 1939. Comparative activity of root inducing substances and methods for treating cuttings. Contr. Boyce Thompson Inst. 10(4):461-480.
9. SNOW, A. G. 1941. Variables affecting vegetative propagation of red and sugar maples. Jour. Forestry 39:395-404.
10. SNYDER, W. E. 1954. Possibilities with mist propagation. Proceedings, Fourth Annual Meeting, Plant Propagators Society, pp. 89-102.

Our Cover

For the first time in its history the JOURNAL OF FORESTRY displays a cover photograph in color. This was made possible through the loan of the color plates by the St. Regis Paper Company of New York City. The photograph first appeared in the 1957 annual report of that company.

Notes

The Heber Trick Tank—A Cistern for Stock Water

The Heber Trick Tank is a device that provides livestock and wildlife water where otherwise there would be none. Based on the principle of the cisterns that were once common for home water supplies, the use of a tin roof to catch precipitation for the tank is credited to Australian origin. The device has successfully "turned the trick" in the Heber area of the Sitgreaves National Forest.

In the early 1930's Lee Kirby, then forest supervisor, read a magazine article describing a method of collecting and storing stock water in a dry region of Australia. Noting the possibilities for use in Arizona, Mr. Kirby assigned Hollis S. Palmer, then a staff assistant on the Sitgreaves, to select a suitable location and design a similar system, considering precipitation, tank size, catchment area, and stock needs.

The complete tank was constructed in 1935 by Civilian Conservation Corps personnel, primarily to provide a drink for sheep on the long trail between the winter range in the Salt River Valley and the summer range above the Mogollon Rim. The Arizona Woolgrowers Association, especially Harry Embach, long time secretary, cooperated by providing materials for the construction work.

Presently about 20,000 sheep use the tank night and morning, twice a year, on the Heber-Reno driveway.[1] In addition, a part of the 100 cattle on the allotment obtain water at the tank during the summer grazing season, and there has been no shortage so far. The maximum sheep use has been 100,000 head, many years ago.

The appearance of the water collector is shown in Figure 1, and the diagramatic plans are given in Figure 2. The size of the water catchment is 97 feet by 118 feet, plus the cover, or roof on the tank, 39 feet by 48 feet. The tank roof is necessary for reduction of evaporation and for sanitation purposes. The total catchment and roof area is 13,318 square feet, about 0.3 acre.

The roof is made of 25-inch by 8-foot sections of corrugated sheet steel roofing, set above the ground on juniper posts and joists. The posts along the 48-foot side are on 8-foot centers, and along the 39-foot sides, 4-foot. Juniper posts were used because of their long life and availability. The roof support posts in the tank itself are 2-inch galvanized pipe. Between the tank him and the tin roof the space is screened with one-fourth inch mesh hardware screen to keep out birds, animals, and trash.

Runoff drains into a steel tank 7.5 feet deep and 40 feet in diameter which is half underground. The tank was constructed from 0.1 inch thick steel plates, 4 feet wide and 7.5 feet long bolted together and coated inside and out with hot asphalt. The tank capacity is 70,497 gallons.

There is a valve, with a lock, at the outlet from the base of the tank. A 2-inch pipe carries water 150 feet to the watering troughs, where a float valve controls the water level. Troughs are made from sheet metal mounted on concrete supports, as shown in Figure 3. There are eight troughs, set level, which are each 10 inches deep, 12 inches wide, and 10 feet long, connected with short lengths of pipe. Troughs and pipe are drained in winter to prevent damage by freezing.

There is no rain gauge at the site, but, at a gauge 1½ miles away, the average annual rainfall for the past five years was about 14 inches. This annual amount of precipitation, if all of it falling on the catchment reached the tank, would yield over 115,000 gallons. A small amount of runoff has been observed from both dew and frost for which the tin collecting area is an excellent condensing surface because of its rapid rate of cooling at night. For each site, the supply of water needed and the rainfall and length of the dry season must be considered in determining the size of the storage tank and catchment area.

This tank and collector has solved a difficult problem in an area where extremely pervious soils made use of ordinary stock tanks impossible. It stores water with minimum loss from evaporation, and the troughs provide clean water for livestock.

It is not a cheap way to develop water. Current costs are not available for a system as large as this

FIG. 1.—View of the catchment area of Heber Trick Tank. Water is led into the tank by the center trough which is 8 inches wide and 12 inches deep. A fence surrounds the structure to prevent livestock from going under the roof.

[1]Line, Francis R. Arizona sheep trek. National Geographic Vol. 97, pp. 457-478. 1950.

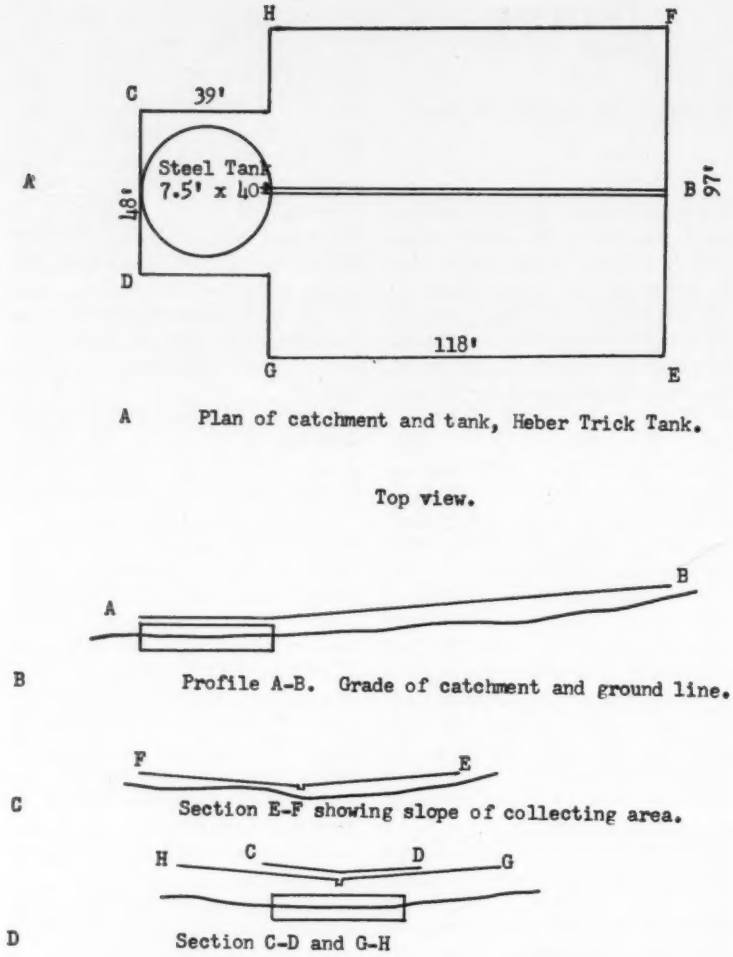

FIG. 2.—Diagramatic plans for Heber Trick Tank.

FIG. 3.—Stock watering troughs made from sheet metal set on concrete posts. Water is led from the storage tank by a 2-inch pipe to these troughs.

one, but some indications are that a 30,000 gallon steel tank with 10,000 square feet of catchment, at a location easily accessible to trucks, bulldozers and other machinery, can be built for approximately $5,000 to $6,000.

Similar water systems have application over much of the arid and semi-arid West, especially where drilled wells are uncertain and costly and where the soils are too pervious for dirt tanks or ponds.

Livestock permittees on the Sitgreaves, both for cattle and sheep, have constructed several similar systems and are presently constructing three additional ones, largely with their personal funds.

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Longleaf Pines Can Form Vigorous Sprouts

It is uncommon to observe vigorous stump sprouting of longleaf pine (*Pinus palustris* Mill.). E. L. Stone, Jr. and M. H. Stone[1] reported that axillary buds produce new needles and, if the leader has been destroyed, strong lateral branches following injury, such as from severe burning or mutilation.

One-year-old seedlings of longleaf pine were planted in deep loamy sand in central Alabama in February 1953. Four years later after the seedlings had begun height growth, it was necessary to destroy them to clear the area for other purposes. They were cut at ground level with an ax in January 1957. In July, some of the stumps were found to be sprouting vigorously.

The trees that sprouted had been severed above the root collar (Figs. 1 and 2). Every stump observed that had all or part of the root collar left had sprouted. Before they were cut, some had reached heights of more than 6 feet and

[1]Stone, E. L., Jr., and M. H. Stone. Root collar sprouts in pine. Jour. Forestry 52:487-491. 1954.

FIG. 1.—Vigorous longleaf pine sprouts formed near the root collar of stems that were cut during the preceding winter.

FIG. 2.—Numerous sprouts formed by longleaf pine. Some needles have been removed to show stems that were severed during the preceding winter.

attained stem diameters of more than an inch. In many cases, more than ten sprouts were produced. Outstanding characteristics that the sprouts exhibited by the middle of the growing season were a highly vigorous appearance and a dense foliage.

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Robert Louis Stevenson on Forest Influences[1]

It may surprise foresters to learn that in the latter part of the nineteenth century a most promising young literary figure briefly turned his attention to certain questions of forest influences. The writer was Robert Louis Stevenson who, as the son of a famous engineer, was not only exposed to scientific knowledge, but was indeed encouraged to make his career in engineering. He had little interest in science as a life's work, however, and was something of a disappointment to his father, Thomas, until the winter of 1871 when he read a technical paper before a learned society. The title of this paper was "On a New Form of Intermittent Light for Lighthouses," and its competence earned the author a silver medal. In 1873 Stevenson delivered a second scientific paper, "On the Thermal Influence of Forests," before the Royal Society of Edinburgh. It was his last such effort and as his biographer J. C. Furnas has said, "No scientific impulse ever had less sequel" (*2*).

When Stevenson wrote his paper there was little known of forest influences—a good deal had been inferred but not much supporting evidence had been collected. It is apparent that his main motive was to show the need for a painstaking series of observations on the true quantitative role of the forest in affecting streamflow and climate. He was disdainful of the broad generalizing characteristic of many scientists of the period, and was critical of those who saw cause and effect after superficial observation. The stimulus behind Stevenson's article was a proposal for establishing forest plantations on the Mediterranean island of Malta. It seemed to him an excellent opportunity for a controlled experiment that would shed some light on forest influences, and he even made recommendations for the design of such an experiment.

The majority of the paper is a rather detailed examination of temperature data originally presented by Becquerel in 1867, and is concerned with three phases of a forest's thermal influence. The first of these is the relation between the temperature of tree trunks and of the air around them. Stevenson shows that the trunk merely acts as a poor conductor, exerting no measurable effect on the surrounding air, but simply following air temperature trends in sluggish fashion. He suggests that this hypothesis is simpler than one enjoying some currency at the time which indicated that the sap of some species was maintained at certain temperatures as a survival mechanism for hot or cold weather.

The second relationship discussed is that between the temperature of air under a forest and of air outside the forest. Here Stevenson shows true originality of thought: after examining the available data he states that in a forest mean summer temperatures are lowered more than mean winter temperatures are raised, and that the result is a slight diminution of the mean annual temperature. Here is probably the first published statement of this phenomenon, which Stevenson himself refers to as a "new feature."

The final relationship is that between the air temperatures above

[1]Gratitude is due Lester G. Wells for use of the Arents Rare Book Collection, Syracuse University, Syracuse, New York.

a forest and above cleared ground. Here Stevenson asserts that forests, regarded as radiating surfaces, react as do other radiating surfaces but that not enough reliable data are available for showing their quantitative effects.

Throughout his exposition Stevenson relies upon the well-chosen word. He uses no graphs, but still manages to express himself fairly lucidly when dealing with cumbersome data. His approach is critical and rational.

An historical note on the article itself is of interest here. While originally published in the *Proceedings of the Royal Society*, two limited printings were made in pamphlet form (*3*). Some years after Stevenson's death specimens of the pamphlet were found which, upon examination by experts, were adjudged forgeries. One of the proofs of forgery was the use of paper containing rag, esparto, and chemical wood. The presence of the latter indicates that the paper could not have been manufactured prior to 1874, a year after the actual publication date of the original pamphlets (*1*).

Literature Cited

1. CARTER, J., and G. POLLARD. 1934. An enquiry into the nature of certain nineteenth century pamphlets. Constable and Co., London.
2. FURNAS, J. C. 1951. Voyage to windward, the life of Robert Louis Stevenson. Wm. Sloane Associates, New York.
3. PRIDEAUX, COL. W. F. 1918. A bibliography of the works of Robert Louis Stevenson. Frank Hollings, London.
4. STEVENSON, R. L. 1873. On the thermal influence of forests. (Communicated and read 19 May 1873.) Proc. Roy. Soc. Edinburgh VIII: 114-125 (1875).

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Soil Depth Affects Windfirmness of Longleaf Pine

Longleaf pines (*Pinus palustris*) on the Escambia Experimental Forest in south Alabama seem most susceptible to windthrow where underlain by clay at a shallow depth. This was indicated by a survey of trees felled by hurricane Flossy in late September 1956.

Nine inches of rain fell within 48 hours just prior to and during the hurricane. Over the 2,500 acres where the survey was made the storm blew down about 300 trees ranging in size from saplings to large sawtimber.

After the storm, 57 soil borings were taken to determine conditions where windthrow had occurred. Down trees were segregated into three classes on the basis of depth to clay or sandy clay layers of the soils on which they had been growing. Proportion of windthrown trees on each class of soil was computed and compared with the proportion of Experimental Forest area in that class. Results are shown in Table 1.

The tabulation indicates very clearly that more trees shallowly underlain by a clay or sandy clay layer were windthrown than would be expected from the proportion of area falling into that class. Restricted root development on shallow soils, along with greater saturation of such soils (due to slowdown of rainwater percolation through the less permeable clay layer) are believed to be primarily responsible. Surface soils on the experimental forest are generally sandy, particularly in the A horizon, and infiltration is usually rapid until a heavy soil is reached.

These results suggest that, following windstorms, foresters managing longleaf pine on the Gulf-coast might well start scouting for windthrow on soils with clay or sandy clay within two feet of the surface.

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TABLE 1.—PROPORTION OF WINDTHROWN TREES BY CLASS OF SOIL

Depth to clay or sandy clay	Forest area in soil class	Wind-thrown trees in soil class
(*Inches*)	(*Percent*)	(*Percent*)
24 or less	46	90
25 to 48	29	7
More than 48	25	3
Total	100	100

FIG. 1.—Clay or sandy clay within two feet of the surface tends to reduce windfirmness of longleaf pines.

Points of View

Comments on "Effects of Silvicultural Practices on Wildlife Food and Cover in Oak and Aspen Types in Northern Michigan"

I have a theory which I would like to see worked on by someone in research, namely:

"Benefits gained by clearcutting, poisoning, or bull-dozing game food plots are *not* sufficiently greater than those derived from normal silvicultural practices to justify their costs."

Reference is made specifically to Table 5 in Leslie Gysel's article in the November 1957 JOURNAL,[1] where clearcutting is graphically compared with a "commercial" cut of aspen.

First, there is a discrepancy in the ages of the regeneration. The clearcut is four years old and should be at its peak in browse production. Part of the commercial cut was seven years old and part is one year old—probably past and premature for optimum browse production.

Moreover, disregarding this possible discrepancy, we believe that it is fallacy to compare partial cutting with clearcutting on an equal acreage basis. That a clearcut acre is superior to an acre partially cut is too obvious to gather comparative data on.

Wildlife must have a sustained yield of food, which means regulation of annual cuts (or periodically, at something less than 10-year intervals). Economy, even for Gysel's clearcutting, necessitates a commercial rotation. So, let us assume a 40-year rotation for aspen with a 20-year cutting cycle for the "commercial" cutting.

In order to maintain a sustained yield on 40 acres our annual cut would be 1 acre clearcut; or 2 acres partially cut. The annual production of browse, then, (using values from Gysel's graph) would be about 9 percent greater by partial cutting!

There may be some significance, also, in the fact that Gysel's studies showed a higher percentage of browse *utilized* on the commercial cut area. (We have noted that deer apparently prefer to browse in partial shade.) In this case, the partial cutting would be nearly 40 percent better.

Other factors tend to make this advantage in partial cutting even greater. To enumerate a few:

1. The silvicultural benefits of partial cutting over clearcutting.
2. The elimination of costs of practice (referring mainly to those of cutting the 330 unmerchantable trees per acre).
3. The probability that vegetative height growth retarded by partial shading will prolong the availability of browse.

This is all theoretical assumption, of course, but our observations indicate that it may be true—except in the case of immature and unmerchantable stands.

ROBERT S. FRANKENBURGER
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In Reply

I would like to make a few comments concerning Mr. Frankenburger's theory and other statements to try to clarify some of the points. First of all, the theory as stated seems confusing to me. There is an implication that clearcutting and poisoning are not normal silvicultural practices. Clearcutting, of course, is widely and successfully used by foresters in different forest types as a reproduction method. Poisoning and other chemical applications are used in various kinds of stand improvement operations which are considered normal silvicultural practices.

The justification of the costs of different practices will ordinarily depend on many variables. In some areas the cost of clearcutting, poisoning, and bulldozing may not be justified for producing browse that might be obtained at less expense by a different kind of silvicultural operation, such as a thinning. In other areas, however, all three methods might be justified for producing wildlife food and cover, especially where other practices may be very costly or may not be feasible at all because of the age, composition, condition, density, or location of the stands.

I agree with the implication in Mr. Frankenburger's theory that ordinarily the most economical way to produce game food is by silvicultural operations that pay their way by present or future returns. The clearcutting of aspen and the pine released from overstory hardwoods by chemical applications described in my article are examples of this. A cost analysis was not made; however, I would estimate that the costs involved may be justified on the basis of returns from the new stands.

I also agree with Mr. Frankenburger that periodic cutting of aspen is an ideal way to obtain a sustained yield of browse in this type. However, I concur with the recommendations of our foresters who are managing aspen stands in northern Michigan that clearcutting is a sound silvicultural reproduction method in pure stands of aspen. As a result of clearcutting, a large number of aspen suckers ordinarily develop enough to feed many other deer and to make well-stocked stands. I know of no good silvicultural reason for making partial reproduction cuts in pure aspen stands and I have not noticed that cover from overstory aspen brought about an increase in the amount of browsing.

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[1] Gysel, Leslie W. Effects of silvicultural practices on wildlife food and cover in oak and aspen types in northern Michigan. Jour. Forestry 55:803-809. 1957.

Reviews

Timber Resources for America's Future

By Forest Service, U. S. Department of Agriculture. 713 pp. Illus. Forest Resource Report No. 14, Supt. of Documents, U. S. Govt. Print. Office, Washington, D. C. 1958. $7.

This imposing volume constitutes the final revision of the Timber Resource Review, released in preliminary draft in 1955 for the purpose of inviting review and comment. It is based upon a nation-wide appraisal by the Forest Service and numerous cooperating agencies begun in 1952 and is the sixth such "State of the Union" report made by the Forest Service down through the years on U. S. forest resources.

America's expanding population will require nearly twice the present production of wood to meet its needs by the year 2000. This demand can be met. But to do so, according to *Timber Resources for America's Future*, will require a better job of forestry on all forested lands.

The report is the result of a nation-wide survey and study made by the Forest Service working with state foresters, other state agencies, forest industries, and many public and private organizations.

A total of 489 million acres of commercial forest land in this country now produces the wood used by 174 million people in homes, industry, packaging, and synthetics. Forty years from now the United States will have to grow 83 percent more timber—or nearly twice as much—to supply the wood needed by a population expected to rise to 275 million.

The United States is not faced with an acute timber shortage. There is no "timber famine" in the offing although shortages of varying kinds and degrees may be expected. But it is equally clear that there is little danger of timber becoming a surplus crop. To meet future timber demands will take earnest effort. Meeting those needs will require not only early action but an intensity of forestry practices much higher than those of today. There are no grounds for complacency. What we do in the next 10 or 20 years will determine whether we shall grow enough timber to enable our children and their children to enjoy the timber abundance that we ourselves know.

The report points out some favorable signs: There is about as much timber today as there was 10 years ago. Sawtimber growth is increasing. Advances have been made in fire-protection, timber utilization, and research. Five million acres of idle lands have been planted to trees. Much progress has been made in forest management, particularly on large industrial holdings and public lands.

Least progress has been made on small private holdings, the survey showed. It also makes clear there is no likelihood of a timber surplus. The best trees are being cut most heavily. Unless forest management is greatly intensified the growth of softwoods will not keep pace with cut, for our main dependence has been on softwoods and the better hardwoods. Records show that every year two or three times as much softwoods as hardwoods are cut.

The United States must rely mainly on the timber grown within its boundaries. It imports only 10 percent of the timber consumed. There is little likelihood of a substantial increase from Canada or other nations.

While pointing out that the United States has the potential to meet future timber demands, the report also warns against complacency. There are too many understocked acres. One out of every four acres of America's commercial forest land, or a total 114 million acres is nearly idle. An even greater area is only partially productive. Insects kill more trees each year than does fire or disease; but in the long run, disease is the most destructive agent. In its long-range effects on sawtimber growth, disease outranks both insects and fire, more than two to one.

Although great progress has been made in prevention and control of forest fires, only 15 percent of the commercial forest area is adequately protected against a really bad fire year. Fire, potentially the greatest forest enemy, still destroys tremendous quantities of timber.

Although great strides have been made in efficient use of timber, about one-fourth of the timber cut each year is not used for any purpose. Thirteen percent of the timber cut is left in the woods to rot, and most of the manufacturing waste is only burned for fuel. In addition little use is now being made of 37 billion board feet of salvageable dead timber and 56 billion board feet of sound material in cull trees.

Also, in cautioning against complacency, the report points out that America's timber is declining in quality. Throughout the country the more desirable trees are losing ground to those of poor quality. One-fifth of the volume of eastern hardwoods is not merchantable because of crookedness, knottiness, or rot.

It is clear from the report that no one really knows how much timber the United States forests can grow. But there is certainly the potential to more than double growth, if forestry knowledge and skills are promptly applied.

The real key to America's future timber supply lies in the hands of the one out of every 10 families who own small forests. Over one-half of the nation's timber lands are in small tracts owned by farmers, businessmen, professional people, housewives, retired individuals,

and others not in the timber business. There are 4,500,000 of these owners. Most of the land owned by forest industries and public agencies are left in reasonably good growing condition after cutting, but on over one-half of the recently cut farm and other small private forests conditions for future growth are far from good. This is most serious in the South. Improving these millions of small forests is America's most important forestry job.

Meeting future demands for timber will require early action, intensified effort, and is a big job for millions of people, according to the report which cites the following as the four best possibilities for increasing timber supplies:

1. Fifty-two million acres, an area the size of Maryland, Indiana, and Maine combined, needs to be planted.

2. Greater progress needs to be made in holding down losses from disease, insects, fires, and other destructive agents, which are far from licked.

3. Timber utilization needs to be improved.

4. Lands need to be left in more productive condition for future growth following cutting.

Forests in public and industry ownership cannot by themselves supply all the timber this country will need, according to *Timber Resources for America's Future*. The millions of small holdings with over half of the nation's forest land must also produce their share. The land is capable of producing the timber needed. The ability and knowhow are available. If there is the will to do it and to act promptly, the job can be done.

Sawdust Empire: The Pacific Northwest

By Howard M. Brier. 269 pp. Illus. Knopf, New York. 1958.

The title, *Sawdust Empire,* leads one to expect that this book would be concerned chiefly with sawmills or the lumber industry. The introduction does state briefly that the present economy of Washington and Oregon harks back to the early days of sawmilling, but only two chapters develop the theme of the title. In Chapter 3, "It's A Tree Country," the author relates the tremendous advances that have taken place in forest management, protection, and utilization, and traces the well-known migration of lumbermen westward. He brings the record up to date with citations from the recently concluded "Timber Resource Review," and discusses several of the problems which now plague the forest industry: conflicting interests in land use, and the inroads of insects and diseases. The title of Chapter 15 brings together two vastly unlike topics, "Lumber and Plutonium." After a discussion of the Hanford Works, Brier turns to the history of Longview, the planned town built by the then Long-Bell Lumber Company, now International Paper. However, little attention is paid to the mills which made the town possible, and practically nothing is said of the tremendous Weyerhaeuser integrated utilization center at Longview. This is certainly the outstanding example of efficient wood processing in the *Sawdust Empire,* and a discussion of lumbering in Washington is incomplete without it.

Other chapters don't get into the woods, but provide a sort of handbook for travellers on the subject of Northwest politics, fish, fruit, beef, dams, industrial growth, arts, cities and towns, early history, and recreation. In cataloging such a wide range of topics few of them can be treated adequately, and this prevents the author from doing full justice to his magnificent subject. In this format he has been forced to abbreviate some portions of the text almost to a census of resources and facilities.

Howard Brier is resoundingly enthusiastic about the two states and he makes this evident throughout. He knows the country, as witness his proper use of skid road to describe the flophouse end of town. There is some good historical background and he has unearthed interesting anecdotes of the early days which might have been lost if not recorded here. Careful research is evident in such passages. They are written with clarity and a feel for the times.

The impact of industrial technology is illustrated in the novel migration of a refinery crew from Olean, New York, to Ferndale, Washington; and in the fabulous story of Boeing airplanes. Here would have been a spot to tell in force the equally great story of forest industry development. Lumber built this far corner of the nation and it warrants much greater attention.

More careful editing would have avoided some errors. Stewart Holbrook, ex-Vermonter and nationally known writer, has resided in Portland, Oregon, since 1923. He will be astonished to read that in 1940 he "moved from Boston to Seattle."

For people who don't know the Pacific Northwest the book is crammed with a remarkable array of information on a multitude of subjects. The very number of topics gives the feeling that this has been a diligent compilation. Howard Brier knows the Northwest so well that his overall interpretation would have been preferable.

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The New Way of the Wilderness

By Calvin Rutstrum. 276 pp. Illus. Macmillan Co., New York. 1958. $4.50.

In 1946 Calvin Rutstrum published *The Way of the Wilderness.* It was a good outdoor manual—sound, practical, and informative—for Rutstrum was then one of the country's veteran campers and wilderness travelers.

Now we have *The New Way of the Wilderness*—up-to-date, more complete, very well written, and better printed and illustrated. The dean of American campers and outdoorsmen, Col. Townsend Whelan, gives strong endorsement in the foreword: "Rutstrum 'savvies' the bush, and what he tells you . . . will be a real help to those of you who plan to enter wild country for recreation or for other purposes."

Here's why, in the opinion of the reviewer, the new book is a milestone in outdoor literature: The coverage is for both travel and camping in the wilderness, and enroute; by foot, canoe, horse, dog team, and auto, at all seasons; and in the north woods, the Arctic, the mountains, and semi-wilderness fringes. How-to's, in wilderness setting, deal with orientation—staying "found"—and what to do if you get lost; with equipment, including clothing, shelter, and personal essentials; foods and cooking, with 34 pages of recipes and menus; and survival, in case of real trouble, with emphasis on self-control, emergency shelter, food—using knowledge and a clear head in getting out of the wilderness alive. Throughout the book, illustrative anecdote, mostly personal, relieves the monotony of straight exposition, and instills in every one of the 16 chapters a distinct, authentic, "been-there" tone.

But these are only the "ways" of wilderness living. The real heart, and perhaps purpose, of the book grows out of the author's philosophy; his evaluation of wilderness lands and how to live, self-sufficient and satisfactorily, on them. He begins on the first page of the first chapter, "The Wilderness Challenge," with the story of Lillian Alling, a homesick but indomitable young immigrant who, after walking to Dawson via Chicago, Minneapolis, and Winnipeg, bought an old boat and worked down the Yukon; she was last seen bartering with Eskimos for passage across the strait to Asia.

"My purpose in mentioning it [the story] is to show that most of us could undertake a wilderness journey of some kind, and succeed, if we would but arouse our determination, lay our plans, and go ahead with it." Objective adventure brought white men to the New World, pioneers to Kentucky, the Prairies, the Pacific, and mountain men into every wild, western "hole." "Many a success story is attributable to the fact that an individual of no unusual talents accomplished something simply by trying. You *can* live well outdoors. Make up your mind to that." Wilderness prerequisites — determination, informed planning, confidence borne of discipline and self-reliance — Rutstrum implies, are deep wells to American success.

To point out a few specifics, Chapter 3, "Canoe Travel and Procedure," may be the best thing in print on this subject, I think. Eleven paddle strokes are defined, described, and beautifully illustrated; and the treatment of wilderness water travel is complete, even to a section on canoeing on the ice! Wilderness camping and equipment, and wilderness foods and cooking, three chapters each, combine the soundness of experience with the aids of modern design. I have read most of the contemporary books on hunting and fishing, but I learned something from "Fishing for Food," and "Hunting for Food," Chapters 14 and 15 of *The New Way of the Wilderness.*

I do not say that Rutstrum's new book will replace Kephart's *Camping and Woodcraft,* the classic manual of outdoor living since 1917; but I do believe that it is the most valuable addition to camping literature since that date.

Both books are published by The Macmillan Company, New York.

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Publications of Interest

An International Glossary of Terms Used in Wood Anatomy, prepared by the Committee on Nomenclature, International Association of Wood Anatomists, is now available. Copies can be obtained from Professor William L. Stern, Editor, *Tropical Woods,* 205 Prospect Street, New Haven 11, Conn. Cost to members of the Association is 15c for uncovered and 20c for covered copies; to non-members the price is 30c and 40c for uncovered and covered copies respectively.

* * *

Recently published in its eighth edition is *Common Forest Trees of North Carolina,* an 87-page guide for tree identification prepared by J. S. Holmes, former state forester. The booklet was first published in 1922. Since then more than 60,000 copies have been distributed, mainly to school libraries, teachers, and pupils. Copies are distributed by the Department of Conservation and Development, Raleigh, N. C., at a cost of 15c. Teachers may obtain single free copies.

* * *

Quantitative Plant Ecology by P. Greig-Smith, a book of 198 pages, was published in 1957 by the Academic Press, Inc., New York. It is a book for research workers, advanced students, and other specialists. This book describes the quantitative methods used in ecology and the application of statistical methods to ecological problems. The seven chapters cover quantitative methods of describing vegetation, sampling problems, random versus non-random distribution of vegetation, association among species, correlation with habitat factors, and delineation of plant communities. Copies are available at $6 each.

Current Literature

Compiled by MARTHA MEELIG, *Librarian, State University College of Forestry at Syracuse University*

Range Management Section Compiled by NELLIE G. LARSON, *Library, U. S. Department of Agriculture*

General

The Elusive Formula of Best Fit: a Comprehensive New Machine Program. By L. R. Grosenbaugh. 9 pp. Southern Forest Expt. Sta., New Orleans. 1958. Occasional Paper No. 158. Mimeog.

Forestry. By N. C. Brown. 31 pp. Illus. Bellman Publ. Co., Cambridge 38, Mass. 1957. Vocational & Professional Monographs No. 8.

Science in New Zealand. Ed. by F. R. Callaghan. 272 pp. Illus. A. H. and A. W. Reed, Wellington, N. Z. 1957. 22s. 6d.

Your Forests. rev. ed. By M. S. B. Bruere. 163 pp. Illus. Lippincott, Philadelphia. 1957. $3.50.

Farm Forestry

Marketing Christmas Trees in Alabama. By B. F. Alvord. 26 pp. Illus. Alabama Polytechnic Inst., Auburn. 1957. Bul. No. 309.

Woodlot Market Report for Montana. By Richard Marks. 13 pp. Montana State College, Bozeman. 1957. Cir. No. 1054. Mimeog.

Forest Economics

Christmas Tree Purchasing Habits of Greater Columbus, Ohio, Consumers—1956. By G. H. Mitchell and Kenneth Quigley. 9 pp. Ohio Agric. Expt. Sta., Wooster. Dept. Mimeog. Ser. A. E. No. 287.

Forest Influences

Watershed Management; An Annotated Bibliography of Erosion, Streamflow, and Water Yield Publication by the California Forest & Range Experiment Station. By C. H. Gleason. 79 pp. Berkeley. 1958. Tech. Paper No. 23.

Forest Resources

Forest Inventory and Reforestation Under the Canada Forestry Act 1952 to 1956. 87 pp. Illus. Canada Dept. of Northern Affairs & Nat'l. Res. For. Branch, Ottawa. 1957. Misc. Publ. No. 9.

Provincial Inventory and Forest Surveys in British Columbia. 50 pp. Illus. Dept. of Lands and Forests, Victoria, B. C. 1957. For. Survey Notes No. 1. Mimeog.

Timber Resources for America's Future. 713 pp. Illus. U. S. Forest Serv., Washington 25, D. C. 1958. For. Res. Rept. No. 4.

Timber Resources Menominee-Grand Marais Block, Upper Peninsula, Michigan. By V. E. Findell, C. D. Chase and A. G. Horn. 71 pp. Michigan Dept. of Conservation, Lansing. 1957. Michigan For. Survey. Mimeog.

Logging and Milling

Simplified Principles for Structural Grading of Timber. By L. J. Markwardt and L. W. Wood. 19 pp. U. S. Forest Products Lab., Madison, Wis. 1958. Rept. No. 2112. Mimeog.

Pathology

Lagringsröta och Blånad i Skogslagrad Barr-och Lövmassaved. Storage Decay and Blue Stain in Forest-Stored Pine, Spruce, Birch and Aspen Pulpwood. By Erik Björkman. 129 pp. Illus. Royal School of Forestry, Stockholm, Sweden. 1958. Bul. No. 29. English summary.

Stockblånad och Lagringsröta i Tall-och Grantimmer vid Olika Avverkningstid och Behandling i Samband med Flottning. Log Blue Stain and Storage Decay in Pine and Spruce Timber with Special Reference to Felling Time and Treatment During Floating. By Erik Björkman. 62 pp. Illus. Royal School of Forestry, Stockholm, Sweden. 1958. Bul. No. 30.

Range Management

Analysis of Range Reseeding Results, Springfield Land Utilization Project. By Charles Terwilliger, Jr. and J. E. Jensen. 16 pp. Illus. Colorado Agric. Expt. Sta., Fort Collins. 1957. Gen. Series Paper No. 666.

Forage Problems and Resources of Iraq. By H. W. Springfield. 37 pp. Illus. International Cooperation Administration, Washington, D. C. 1957.

Germination of Fourwing Saltbush Seed Improved by Scarification and Grading. By E. C. Nord and J. E. Whitacre. 5 pp. California Forest and Range Expt. Sta., Berkeley. 1957. Forest Res. Notes No. 125.

Hauling Water for Range Cattle. By D. F. Costello and R. S. Driscoll. 6 pp. Illus. U. S. Dept. of Agric., Washington, D. C. 1957. Leaflet No. 419.

Livestock and Deer Ratios for Texas Range Lands. 9 pp. Illus. Texas Agric. Expt. Sta., College Station. 1957. MP No. 221.

Man's Role in Changing the Face of the Earth, International Symposium. Ed. by W. L. Thomas. 1192 pp. Chicago, University of Chicago Press. 1956. $12.50.

Silviculture

Cultivation of the Cricket Bat Willow. 34 pp. Illus. Great Britain Forestry Commission, London. 1958. Bul. No. 17. 5s.

Effects of Burning on Ozark Hardwood Timberlands. By L. K. Paulsell. 24 pp. Illus. Univ. of Missouri Agric. Expt. Sta., Columbia. 1957. Res. Bul. No. 640.

Field Spruce in Nova Scotia. By M. H. Drinkwater. 23 pp. Illus. Canada Dept. of Northern Affairs & Nat'l. Res., For. Branch, Ottawa. 1957. For. Res. Div. Tech. Note No. 65.

Silvical Characteristics of Honeylocust. By D. T. Funk. 14 pp. Central States Forest Expt. Sta., Columbus 15, Ohio. 1957. Misc. Release No. 23.

Silvical Characteristics of Slippery Elm. By H. F. Scholz. 14 pp. Illus. Lake States Forest Expt. Sta., St. Paul, Minn. 1958. Sta. Paper No. 59.

Silvical Characteristics of White Oak. By L. S. Minckler. 18 pp. Illus. Central States Forest Expt. Sta., Columbus 15, Ohio. 1957. Misc. Release No. 21.

Thinnings in Even-Aged Stands; a Summary of European Literature. By Peder Braathe. 92 pp. Faculty of Forestry, Univ. of New Brunswick, Fredericton. 1957.

Wildlife Management

More Wildlife Through Soil and Water Conservation. By W. L. Anderson and L. V. Compton. 16 pp. Illus. U. S. Soil Conserv. Serv., Washington 25, D. C. 1958. Agric. Info. Bul. No. 175. 10 cents (Govt. Print. Off.)

Nutritional Requirements of White-Tailed Deer for Growth and Antler Development, II. . . By N. D. Magruder and others. 21 pp. Illus. Pennsylvania State Univ. Agric. Expt. Sta., University Park. 1957. Bul. No. 628.

Of Man and Beast; a History of New Hampshire Game and Fur Bearers. By Helenette Silver. 466 pp. Illus. New Hampshire Fish and Game Dept., Concord. 1958. $2.85.

The Prairie Grouse of Michigan. By G. A. Ammann. 200 pp. Illus. Michigan Game Commission, Lansing. 1957.

Small Mammal Studies on a Southeast Alaska Cutover Area. By R. C. McGregor. 9 pp. Illus. Alaska Forestry Research Center, Juneau. 1958. Sta. Paper No. 8.

Wood Technology and Utilization

Occurrence of Tension Wood and Related Seasoning Defects in California Black Oak. By H. E. Wahlgren. 8 pp. U. S. Forest Products Lab., Madison, Wis. 1958. Rept. No. 2106. Mimeog.

Results of Impact Tests to Compare the Pendulum Impact and Toughness Test Methods. By J. T. Drow. 12 pp. Illus. U. S. Forest Products Lab., Madison, Wis. 1958. Rept. No. 2109. Mimeog.

Wood Receipts by Fiber and Board Plants in California, 1956. By R. H. May. 3 pp. California Forest and Range Expt. Sta., Berkeley. 1957. For. Survey Release No. 29. Mimeog.

Society Affairs

Officers and Council
1958-1959

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HENRY J. VAUX
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University of California
Berkeley 4, Calif.

Society of American Foresters
1958 Annual Meeting
Schedule of Events Announced

The 1958 annual meeting of the Society of American Foresters will be held in Salt Lake City, Utah, September 29, 30 and October 1, 2. Final plans for the meeting were approved by the Committee for the Meeting at a conference in Logan, Utah on April 3.

The theme will be "Multiple-Use Forestry in the Changing West."

Headquarters for the event will be the Hotel Utah. The July issue of the JOURNAL OF FORESTRY will contain a form for requesting room reservations. Inasmuch as the headquarters hotel will be unable to house all those in attendance, other near-by and suitable hotels and motels will be available. Early reservations will be advisable and members are requested to consult the July issue for instructions.

The July issue will also contain the programs for the various sessions and other scheduled events.

Ladies are welcome and invited, and special programs and activities are being planned for them.

Schedule of Events

Saturday, September 27

Council of Forestry School Executives; morning and afternoon.

Sunday, September 28

SAF Council; morning and afternoon.

Editorial Board, JOURNAL OF FORESTRY; evening.

Association of Consulting Foresters, open meeting; evening.

Monday, September 29

Opening General Session, morning.

Society Affairs Session; afternoon.

Division of Forest Products; evening.

Division of Watershed Management; evening.

Division of Education; evening.

Tuesday, September 30

Division of Forest Management; morning and afternoon.

Division of Forest Recreation; evening.

Division of Forest Economics; evening.

Division of Forest-Wildlife Management; evening.

Wednesday, October 1

Division of Silviculture; morning and afternoon.

Division of Forest-Range Management; morning and afternoon.

Society Dinner; evening.

Thursday, October 2

Field Trip to Wasatch Watershed Management areas; morning and afternoon; men only.

Ladies' Scenic Tour; morning and afternoon.

Committee for the Meeting

The general co-chairmen for this meeting are Floyd Iverson, U. S. Forest Service, Ogden, Utah; and Reed W. Bailey, Intermountain Forest and Range Experiment Station, Ogden, Utah.

Chairman of the Program Committee is Lewis M. Turner, College of Forest, Range and Wildlife Management, Utah State University, Logan, Utah.

The chairman of the Committee on Arrangements is F. C. Koziol, U. S. Forest Service, Federal Building, Salt Lake City, Utah.

The Council's Column

Forestry and Outer Space

In this day of missiles and emphasis on engineering and the physical sciences, is it not timely that foresters and other professionals in the biological sciences do some stock-taking of the roles of these sciences in our national defense Or, should these sciences take a back seat in our national attention to education, to research, to resource protection, and development?

Here and there, I find a few foresters raising these questions. They point out that requirements for defense and outer space today and for the future can be met only if supported by a sizable chunk of natural resources.

A state forester the other day made this observation: "A State travels on its resources." In terms of space travel does not the same apply? He also observed: "The standard of living is in relation to these resources." He meant it in the broad sense.

A research forester points to the fact that biological resource professions in the Western Hemisphere have relied in the past on Old World countries for the results from basic pioneering research. He asks whether we can afford to continue to do so. I assume he has one eye on the Iron Curtain. His other eye, for sure, is on the long-range defense and well being of his country and the free world.

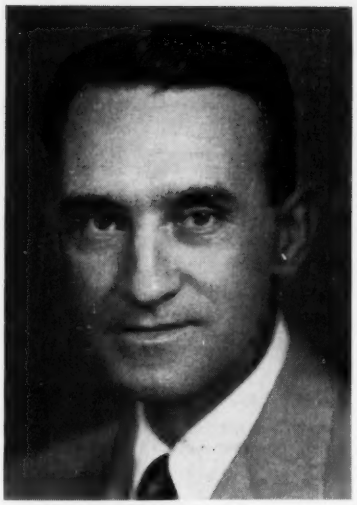
A forestry professor looks with some envy, but with real concern, over the current accent placed on higher standards for physical science and engineering education—facilities, faculty, and student recruiting. He believes along with the engineering and other science professionals that formal education is basic. Few who look to the future question his point of view.

The Society of American Foresters has specific working relations with other professional science societies in the biological resource fields. Together they have joint programs for calling attention to the importance of natural resource foundations for defense and advancement of free people. Perhaps these programs need to be stepped up. The Society has working relations with professional groups of physical scientists and engineers. Maybe we need to improve joint programs for understanding with them. We are all in the same boat.

The Society, however, is no stronger than its membership. If the above concerns and questions are valid, then is not the burden of proof really on us as individual professionals—the practicing forester, the research forester, the forester on the faculty? And, should we not be doing some things additional ourselves on our home grounds?

Surely the price for modern defense is high. But, so are the stakes. And, much of the price is our basic resources, among them wood, water, and forests. Is it not therefore timely, more than timely, for foresters as professionals to take a hard look at basic resources for our future defense, even for advancement into outer space?

DONALD E. CLARK



HAROLD G. WILM
Directs Nation-wide Study

Society Launches Study of Education

A nation-wide study of education in forestry and related fields of natural resources management will be started in June by the Society of American Foresters, according to an announcement by George A. Garratt, Society president. The project has been made possible by a grant from the Old Dominion Foundation, Inc. of New York City.

The appraisal is being undertaken at the request of representatives of 25 colleges and universities because of the nation's economic and social dependence on forests and related renewable natural resources and on their products and services.

Harold G. Wilm of Syracuse, N. Y. has been appointed director of the study, which is expected to continue over a period of two years. Dr. Wilm is associate dean of the College of Forestry, State University of New York. He will work with the following supervisory committee of educators and foresters.

Chairman Henry J. Vaux, dean of the School of Forestry, University of California, Berkeley.

Richard E. McArdle, chief of the Forest Service, U. S. Department of Agriculture, Washington, D. C.

Bernard L. Orell, vice president of Weyerhaeuser Sales Company, Saint Paul, Minn.

Hardy L. Shirley, dean of the College of Forestry, State University of New York, Syracuse.

Secretary, Henry Clepper, executive secretary of the Society of American Foresters, Washington, D. C.

Dr. Garratt, president of the Society, will serve on the committee ex officio. He is dean of the School of Forestry, Yale University, New Haven, Conn.

The principal object of the study is to set goals for professional and technical education in forestry and such related fields as forest-range management, forest recreation, forest-wildlife management, watershed management, wood technology. All are offered as curriculums in the nation's 37 professional forestry schools.

The inquiry will try to find solutions for certain vexing problems involving the adequacy of existing schools, curriculums, faculties, and student recruitment. The relation of the professional schools to the colleges and universities that give subprofessional and specialized courses in the subjects having to do with the management of renewable natural resources will be examined. Among other things, an attempt will be made to answer the question "how good?" as well as "how much?"

A report of the findings will be published by the Society as a book. It should be available early in 1960.

Cooperation Invited in Development of Seed Testing Rules

A sub-committee of the Association of Official Seed Analysts is currently working on the development of rules for testing tree and shrub seeds. The Association includes both Canadian and United States representatives. Anyone interested in becoming active in this work or in sending suggestions should contact Louisa A. Jensen, Cooperative Seed Testing Laboratory, Corvallis, Ore.

Columbia River Section Meets

More than 400 persons attended the annual indoor meeting of the Columbia River Section which was held in Bend, Ore., on April 18-19, 1958. Keynoted by the nationally recognized conservationist, Judge Robert Sawyer, other featured speakers included SAF president George A. Garratt and Bureau of Land Management Director Edward Woozley. "Intensification" was the meeting theme.

The first of three professional discussions on April 19 was concerning the economics of intensified forestry. Speakers were C. Davis Weyerhaeuser, manager of the forestry, lands, and timber department of Weyerhaeuser Timber Company, and J. Herbert Stone, regional forester of the Pacific Northwest Region, U. S. Forest Service.

During the second professional session, Robert F. Tarrant of the U. S. Forest Service and Tom Orr of Weyerhaeuser Timber Company described research in forest soils and the use of soils knowledge in forest management.

Intensified land management was the subject of the third panel. Speakers were Clarence W. Richen, manager of the northwest timber department of Crown Zellerbach Corporation; Philip W. Schneider, director of the Oregon State Game Commission; and Dwight Phipps, state forester of Oregon.

Outstanding accomplishments of the committees on forest soils, herbicides, and water management were noted during the Section Action session, according to Robert D. Hostetter, chairman of the Section. Those committees are headed, respectively, by George H. Schroeder, Carl M. Berntsen, and William K. Ferrell. Credit for the favorable response to the *Western Forester,* published jointly by the Puget Sound and Columbia River Sections, was given to Editor E. F. Peffer and Business Manager Clyde Stratton and their helpers.

Eugene, Ore., was selected as the place of the next annual indoor Section meeting by the Section Executive Committee which met on April 18. An invitation of the Coos Chapter to hold an outdoor Section meeting in the Coos Bay area in September was accepted.

Other action taken by the Executive Committee included development of plans to secure the publication in the JOURNAL OF FORESTRY of a larger proportion of short items of current interest to practicing foresters in the Northwest and plans to ascertain the appropriateness of civil service job specifications for foresters and civil engineers.

Also featured during the Bend meeting were a tour through the Brooks-Scanlon, Inc. sawmill, a visit to the Forest Service pine nursery, the stage musical "Oklahoma," a ladies' luncheon, and hobby and handicraft show.

General chairman for the meeting was Donald L. Peters. He was assisted by S. T. Moore, program; Thomas A. Links, arrangements; Calvin L. Smith, publicity; Henry W. DeBruin, registration; James Sowder, ladies' activities; and Barney Duberow and Edwin L. Mowat, reservations. Albert Wiesendanger, director of Keep Oregon Green, assisted with decorations, displays, registration, and lighting.

Intermountain Section Meeting

"Fire Control in Alaska" was the title of the slide lecture presented by Roger Robinson, fire control officer, Bureau of Land Management, Anchorage, Alaska, to a dinner meeting of the Intermountain Section of the SAF on March 4, 1958 in Missoula, Mont.

The members of the Intermountain Section were dinner hosts to 76 members of the Forest Fire Research Councils of Montana and Idaho-Utah who were holding a two-day meeting in Missoula.

Mr. Robinson discussed and pictured some rather startling facts pertaining to the fire control problems of interior Alaska. Of the 390 million acres of Public Domain lands in Alaska, 225 million acres have vegetative cover and need fire protection. Of these 225 million acres, 125 million support forest cover.

Prior to 1940, it is estimated that five to eight million acres were lost annually to fire. In 1940 the Alaska Fire Control Service was set up to study the situation. Since that time the fire protection has been taken over by the Bureau of Land Management which presently employs 16 people on a permanent basis; plus 25 on a seasonal basis. Alaska is still suffering large losses—an annual average loss from fire of 1,200,000 acres during the past 18 years. The 1957 fire season was serious, with an estimated loss of 5,034,000 acres.

Due to remoteness of most of Alaska's interior, transportation and communication difficulties, rugged terrain interspersed with thousands of lakes, and the small size of the protection force, terrific losses are being suffered each year, not alone to timber, but to watersheds, game ranges, and migratory waterfowl habitat. Mr. Robinson's plea was that we not wait too long to provide adequate fire protection for our nation's resources awaiting development in Alaska.

Don Baldwin, vice-chairman of the Intermountain Section, conducted the meeting. John Milodragovich and Jack S. Barrows served as program chairmen.

Membership Certificate Increase

Effective June 1 cost of membership certificates will be $1.50 each. These certificates are available to Members only; those in Junior and other grades of membership do not qualify.

The certificate, suitable for framing, is 14 × 18 inches. The Member's name is hand-lettered and the Society's gold seal attached. Inasmuch as these certificates are hand-lettered outside the Society's office, orders are held until a sufficient number warrants the attention of the draftsman.

Dues Deadline June 30

Members who have not paid their 1958 dues will receive a letter and a third dues reminder this month. Members whose dues are not paid by June 30 will be declared in bad standing. They will not receive the JOURNAL OF FORESTRY, be a candidate for office, or be eligible to vote until their dues are paid. If you have not mailed your payment for 1958 dues, do it today so you will not be declared in bad standing.

Accrediting Associations Named by National Commission

For the information of the membership of the Society of American Foresters, which is the sole accrediting agency for professional forestry education in the United States, the JOURNAL publishes the following list of accrediting associations as compiled by the National Commission on Accreditation.

During the past seven years the Society has been carrying on its accrediting activities jointly with the ap-

propriate regional educational associations and in cooperation with the professional associations.

Regional Accrediting Associations

Middle States Association of Colleges and Secondary Schools
F. Taylor Jones, executive secretary
Commission on Institutions of Higher Education, 15 Park Row, New York 38, N. Y.

New England Association of Colleges and Secondary Schools
Richard G. King, secretary
Standing Committee on Institutions of Higher Education, 10 Winslow Road, Winchester, Mass.

North Central Association of Colleges and Secondary Schools
Norman Burns, secretary
Commission on Colleges and Universities, 5835 Kimbark Avenue, Chicago 37, Ill.

Northwest Association of Secondary and Higher Schools
Fred L. Stetson, executive secretary
School of Education, University of Oregon, Eugene, Ore.

Southern Association of Colleges and Secondary Schools
Gordon W. Sweet, executive secretary
Commission on Colleges and Universities, 316 Peachtree Street, N.E., Atlanta, Ga.

Western College Association
Mitchell P. Briggs, secretary
1225 East Weldon, Fresno 4, Calif.

Professional Associations

American Association of Collegiate Schools of Business
Richard C. Reidenbach, executive secretary
Washington University, St. Louis 5, Mo.

American Bar Association
John G. Hervey, adviser
Section on Legal Education and Admissions to the Bar, Liberty Bank Building, Oklahoma City, Okla.

American Chemical Society
J. H. Howard, secretary
Committee on Professional Training, 343 State Street, Rochester, N. Y.

American Council on Education for Journalism
Walter Wilcox, executive secretary
School of Journalism, University of Iowa, Iowa City, Iowa.

American Council on Pharmaceutical Education
P. H. Costello, secretary
77 West Washington Street, Chicago 2, Ill.

American Dental Association
Shailer Peterson, secretary
Council on Dental Education, 222 East Superior Street, Chicago 11, Ill.

American Library Association
Robert L. Gitler, secretary
Committee on Accreditation, 50 East Huron Street, Chicago 11, Ill.

American Optometric Association
William Greenspon, chairman
Council on Optometric Education, Elks Building, Bluefield, W. Va.

American Psychological Association
Bruce V. Moore, executive officer
Educational Training Board, 1313 16th Street, N.W., Washington 6, D. C.

American Public Health Association
Berwyn F. Mattison, executive secretary
1790 Broadway, New York 19, N. Y.

American Society of Landscape Architects
Marion V. Packard, secretary
Committee on Education, School of Architecture and Landscape Architecture, Ohio State University, Columbus 10, Ohio.

American Veterinary Medical Association
T. L. Jones, secretary
Committee on Education, Ontario Veterinary College, Guelph, Ontario, Canada.

Association of American Law Schools
Frank R. Strong, secretary
School of Law, Ohio State University, Columbus 10, Ohio.

Council on Social Work Education
Mildred Sikkema
Consultant on Education Services, 345 East 46th Street, New York 17, N. Y.

Engineers' Council for Professional Development
S. L. Tyler, secretary
Education and Accreditation Committee, 29 West 39th Street, New York 18, N. Y.

Liaison Committee on Medical Education
Edward L. Turner, secretary
535 North Dearborn Street, Chicago 10, Ill.

National Architectural Accrediting Board
Elliott L. Whittaker, secretary
School of Architecture and Landscape Architecture, Ohio State University, Columbus 10, Ohio.

National Association of Schools of Design
Dana P. Vaughan, chairman
Committee on Standards, Cooper Union for the Advancement of Science and Art, Cooper Square, New York 3, N. Y.

National Association of Schools of Music
Burnet C. Tuthill, secretary
1822 Overton Park Avenue, Memphis 12, Tenn.

National Council for Accreditation of Teacher Education
W. Earl Armstrong, director
Mills Building, 17th St. and Pennsylvania Ave., N.W., Washington 6, D. C.

National League for Nursing, Inc.
Eleanor M. Helm, director
Department of Baccalaureate & Higher Degree Programs, 2 Park Avenue, New York 16, N. Y.

Society of American Foresters
Henry Clepper, executive secretary
Mills Building, 17th St. and Pennsylvania Ave., N.W., Washington 6, D. C.

National Commission on Accrediting
William K. Selden, executive secretary
1785 Massachusetts Avenue, N.W., Washington 6, D. C.

Society of American Foresters

425 Mills Building
17th Street at Pennsylvania Avenue, N. W.
Washington 6, D. C.

Membership Eligibility

Entrance Grades

An applicant may apply for initial election to Society membership in one of the six grades: (1) Student Member; (2) Junior Member, Class A; (3) Affiliate Member, Class, A, B, or C; (4) Associate Member, Class A or B; (5) Corresponding Member; and (6) Honorary Member. The appropriate grade for which a candidate should apply can be determined by examining his qualifications in relation to the requirements.

In considering candidates for initial election to Society membership, the Sections are concerned chiefly with the Student Member, Junior Member, Affiliate Member, and Associate Member grades, and only rarely with the Corresponding or Honorary Member grades.

Student Member Grade

(Constitution Art. III, Sec. 3; Bylaw 4)

A junior, senior, or graduate student (not eligible for Junior Membership) regularly enrolled in an approved curriculum in an accredited forestry school is eligible for Student Membership.

Student Members are members of the Society and of the Section and Chapter where their schools are located. They have no vote but may attend any meeting of the Society (including those of Divisions, Sections, and Chapters) and take part in the discussions. Dues of Student Members are $3 per year. Newly elected Student Members pay dues on a quarter-year basis. Student members advanced to the Junior Member grade, during the calendar year in which they are graduated, are not charged Junior Member dues for that year, nor are they assessed the usual $5 admission fee. Student Members are not required to pay Section dues.

The Section's representative at each forestry school supervises the processing of Student Member applications. The signature of one voting member (generally of the faculty) is required in item 7 of the appplication form. Section endorsement is not required.

Students complete the first 4 items of the application form, sign their names in item 6, and provide dues in advance for the Section representative to mail to the Society office with the application.

Student Members may be advanced to Junior Membership upon graduation if they meet the requirements.

Junior Member Grade, Class A
(Constitution Art. III, Sec. 5; Bylaw 6)

There are two ways to enter the Junior grade, Class A. One is by advancement from the Student grade, which procedure is described under "Advancement." The other procedure applies to graduates of approved curricula in accredited forestry schools who were not Student Members.

Graduates of forestry schools which were not accredited at the time of their graduation may apply immediately for Junior Membership, Class A, if their schools have since been accredited. This provision applies to graduates who at the time of such application are either nonmembers or Affiliate Members. Applicants for Junior Membership need not be engaged in forestry work.

An applicant who is a graduate of an approved curriculum should complete the first six items of an application form. The signature of one voting member in item 7 is required; Section endorsement is not.

Affiliate Member Grade, Class A
(Constitution Art. III, Sec. 4; Bylaw 5, Class A)

Graduates of nonaccredited forestry schools may apply for the Affiliate grade, Class A, if they have completed all the required basic forestry courses which must be included for a forestry curriculum to be approved.

Since these applicants qualify wholly on the basis of education, their applications may be endorsed by the signatures of three voting members and/or a Section. Endorsement forms are not required.

Affiliate Members, Class A, are eligible to apply for advancement to the Junior grade, Class B, after two years of qualifying forestry experience subsequent to election to the Affiliate grade.

Affiliate Member Grade, Class B
(Constitution Art. III, Sec. 4; Bylaw 5, Class B)

An applicant unable to qualify for membership through education alone may be able to qualify for the Affiliate grade, Class B, through practical forestry experience or through a combination of education and experience.

Six years of acceptable forestry experience is the minimum requirement. Each academic term of appropriate training at ranger, vocational, or professional forestry schools may be substituted for one year of practical training up to a maximum of two years. An "academic term" is one school year of two semesters, or three quarters, totaling approximately nine months.

Qualifying forestry experience includes forest management work such as forest protection, timber stand improvement, planting, timber marking, timber estimates, thinnings, erosion control, and similar forestry activities; or wildland work such as range, wildlife, or recreation management; or those aspects of utilization, having a definite relationship to the growing of forest crops. The applicant need not have had experience in all these activities, but he should have had experience in more than one or two. This experience does not have to be in supervisory positions. It does not have to be of professional caliber. However, the applicant must have been regularly engaged in such work on a full-time basis. The intention is that he shall have learned something about professional forestry and shall have acquired some technical knowledge and skill in one or more aspects of it. It is not just "interest" in forestry that qualifies, but actual practical experience. An unusually competent fire warden or timber cruiser, for example, who has had no formal education in forestry might qualify for this membership grade.

The Sections are expected to use judgment and discrimination in substituting practical experience for professional education in forestry. The purpose is to provide one grade of Society membership for exceptionally able men with forestry experience who would not be able to qualify through educational requirements alone.

An applicant for the Affiliate grade, Class B, should complete items 1 through 6 of the application form. In filling out the experience record, item 4, he must show how much time was spent in the different kinds of work and specifically what he did. Endorsement must be by the Section and the application must be supported by statements of endorsement on standard endorsement forms by three voting members. The application, if approved by the Section, should be endorsed by the Section in item 7.

Affiliate Member Grade, Class C
(Constitution Art. III, Sec. 4; Bylaw 5, Class C)

Graduates of accredited forestry schools who have majored in wood utilization, wood technology, wildlife management, or range management, where these curricula did not include all the five professional forestry courses, may apply for Affiliate grade, Class C. Provision is thus made for entrance into the Society, immediately upon graduation from accredited institutions, of graduates in certain specified curricula not approved for Junior Membership.

Since these applicants qualify wholly on the basis of education, their applications may be endorsed by the signatures of three voting members and/or a Section. Endorsement forms are not required. Affiliate Members, Class C, are eligible to apply for advancement to the Junior grade, Class B, after two years

Coming Events

Forest Products Research Society

The twelfth annual meeting of the Forest Products Research Society will be held June 22-27 at Madison, Wis.

Conservation Education Association

The CEA will hold its fifth annual conference at the University of Utah, Salt Lake City, August 18-21.

N. E. Tree Improvement Conference

The Northeast Tree Improvement Conference will be held at Beltsville, Md., August 21-22.

Society of American Foresters

The Hotel Utah, Salt Lake City, will be headquarters for the Society's 58th annual meeting scheduled for September 28-October 1.

American Forestry Association

The 83rd annual meeting of the American Forestry Association will be held in Tucson, Ariz., October 27-30, 1958. Headquarters will be the Pioneer Hotel. Meeting theme: "Water, Forests, and People."

This D4 piles slash from a daily cut of 50,000 bd. ft.

The White Swan Lumber Co., White Swan, Washington, uses this CAT* D4 Tractor with Fleco Root Rake in its selective logging operation on the Yakima Indian Reservation. The D4 piles slash from a daily cut of 50,000 bd. ft. It works an 8-hour day, 5 days a week. The company bought it for several reasons. Among them: the excellent reputation of the nearby Caterpillar Dealer for service and the excellent reputation of Caterpillar-built equipment for dependable performance under difficult conditions. Robert Turner, White Swan's superintendent, says: "We're very well satisfied with our D4."

Any machine can do the easy jobs. But it takes a tough machine to stand up day after day under the punishment of hard work. That's the kind of work heavy-duty Cat-built machines take in stride. For example, the D4 is compact and maneuverable, but rugged enough to handle any man-sized assignment in rough going—fighting fires, opening fire lanes or building roads. From its specially hardened track shoes and pins to its sturdy 63 HP (flywheel) Caterpillar Diesel Engine, it is built to outwork and outlast any machine in its power range. What's more, since it burns low-cost, non-premium fuel without fouling, it's economical to operate. And maintenance takes a minimum amount of time. The exclusive Caterpillar fuel system requires no adjusting.

Your Caterpillar Dealer backs every Caterpillar unit, no matter how old, with parts you can trust. He provides prompt service 24 hours a day. For complete facts about the D4, call on him. Better still, ask to see it working—he'll be glad to demonstrate!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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MODERN HEAVY-DUTY LOGGING EQUIPMENT FOR THE HARD JOBS

of qualifying forestry experience subsequent to election to the Affiliate grade.

Associate Member Grade, Class A
(Constitution Art. III, Sec. 8; Bylaw 8, Class A)

Nonforesters are eligible for the Associate grade, Class A, if they are scientists working in fields closely allied to forestry. Those eligible for the Associate grade include specialists in forest products, forest economics, forest taxation, land utilization, the lumber industry, graduates of specialized curricula in wood utilization, pulp and paper manufacture, logging engineering, watershed management, forest pathology and entomology, meteorology, and similar specialties.

An applicant for Associate Membership grade must have had professional education in his own field of specialization equivalent to that of Junior Members. His qualifications and attainments in his own field of work must be comparable to those required for the SAF Member grade. Moreover, he must be working closely with foresters and rendering substantial service to forestry. The professional requirements of this grade are considerably higher than those for the Affiliate grade.

Applicants for the Associate grade, Class A, should complete the first six items of the application form. Applications must be supported by statements of endorsement by three voting members using standard endorsement forms. Section endorsement is required.

Associate Member Grade, Class B
(Constitution Art. III, Sec. 8; Bylaw 8, Class B)

Nonforesters who have made outstanding contributions in public or private forestry are eligible to apply for the Associate grade, Class B.

Those eligible for this grade are persons who are not possessed of a scientific education and are not pursuing scientific activities, but who through their activities in forestry, public or private, have shown that they understand the fundamental objectives and principles of forest economics, management, and technical practice, and whose services in these respects are recognized generally by members of the profession who would normally be expected to know of their activities. The words "recognized by the profession generally" mean that the members of a Section generally recognize that these services have a value to the profession generally, that is extending outside the boundaries of the Section.

Applicants for the Associate grade, Class B, should complete the first six items of the application form. Applications must be supported by statements of endorsement by three voting members on standard endorsement forms. Section endorsement is required.

Corresponding Member Grade
(Constitution Art. III, Sec. 9)

Corresponding Members are citizens of countries other than the United States, its possessions, or Canada, who are actively engaged in forestry and who have special interest in American forestry. Sections have no action to take in connection with the applications of Corresponding Members inasmuch as endorsement is by the Committee on International Relations.

Honorary Member Grade
(Constitution Art. III, Sec. 10)

This grade is for individuals who have

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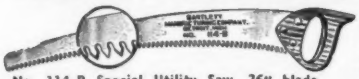

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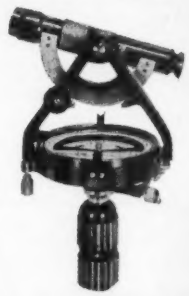

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rendered distinguished service to forestry in America or abroad. If candidates are citizens of the United States, its possessions, or Canada, they must be nonforesters. If citizens of other countries, candidates may or may not be professional foresters. Only in rare instances will Sections recommend candidates for this grade. The Sections should contact the Society office for the procedure to be followed.

Advancing to Higher Grades

Student Members may be advanced to the Junior Member grade; Affiliate Members to the Junior Member grade; Junior Members to the Member grade. Some distinguished Members may be elected to the Fellow grade.

Student Member to Junior Member
(Bylaw 37)

Student Members are eligible for advancement to the Junior grade, Class A, immediately upon graduation. Students, in applying for Student Membership, in effect apply for advancement to the Junior grade as soon as they meet the requirements. On his application the student designates the date on which he expects to graduate. If on that date the Student Member has met the requirements of the Junior grade, his advancement becomes effective in due course. The $5 admission fee is waived as are Junior member dues and Section dues for the year of graduation.

Affiliate Member, Class A, to Junior Member, Class B
(Constitution Art. III, Sec. 5; Bylaw 6)

The Class A Affiliate Member is one who graduated in forestry from a nonaccredited school. The only additional requirement for advancement to the Junior Member grade is two years of qualifying experience since his election to the Affiliate grade. Note that this is since election to the Affiliate grade, not two years since graduation.

"Qualifying experience" means employment in forestry work, which may be broadly interpreted to include forest management and the growing of forest crops, protection, research, surveys, wildland work such as range, wildlife and recreation, erosion control work definitely tied in to forest or wildland management, and utilization if it has a definite relationship to growing forest crops.

The applicant should complete the first six items of the standard application

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form. Applications must be supported by statements of endorsement by three voting members using standard endorsement forms, and if approved should be endorsed by the Section.

Affiliate Member, Class B, to Junior Member, Class B
(Constitution Art. III, Sec. 5; Bylaw 6)

The Class B Affiliate Member is one who entered the Society on the basis of experience alone, or on the basis of experience plus some professional forestry education. Required for advancement are two additional years of qualifying forestry experience and specific evidence that the candidate has the equivalent of the education of a forestry school graduate.

It is this latter requirement that causes misunderstanding. The difficulties center around interpretation of the requirement that the candidate must have acquired a broad technical forestry understanding equal to that of a professional forestry school graduate. Difficulty usually is also encountered in presenting such evidence.

Most of these cases concern candidates who have had long and successful experience in one subject-matter field—for example, experience as a fire warden, timber cruiser, or logging engineer. The problem that has to be met is whether or not these candidates can qualify as professional foresters under the requirements of Bylaw 6.

Bylaw 6 requires that to be eligible for advancement to the Junior grade candidates must give satisfactory evidence "that during their total experience they have gained a knowledge of all the basic courses which must be included as a minimum in an approved curriculum in an accredited forestry school." The intent is that the candidate shall have a knowledge of the subject-matter fields indicated by the names of these courses. The Council does not rate a candidate's experience record on the basis of being precisely and exactly the same as college training. But the Council does want evidence of *broad* experience. The pattern of broad experience is the same as that set for admission to the Junior grade on the basis of college training alone.

Applications for advancement from Affiliate Class B to the Junior grade must be supported by endorsement of three voting members. Section endorsement is required.

Affiliate Member, Class C, to Junior Member, Class B
(Constitution Art. III, Sec. 5; Bylaw 6)

The Class C Affiliate Member is one who graduated from an accredited forestry school and majored in wood technology, wildlife management, or range management where these curricula did not include all the five professional forestry courses.

The only additional requirement for advancement to Junior Member is two years of qualifying experience since being elected to the Affiliate grade. Note that this is since election to the Affiliate grade, not two years since graduation.

Applications for advancement from Affiliate Class C to the Junior grade must be supported by endorsement of three voting members. Section endorsement is required.

Junior Member to Member
(Constitution Art. III, Sec. 6; Bylaw 7)

Class A and Class B of the Junior grade are used only to indicate which route the applicant followed to achieve election. Once elected, the distinction disappears and has no bearing in determining a Junior Member's eligibility for advancement to Member.

The applicant must meet three other basic requirements: (1) three years of qualifying forestry experience after first becoming eligible for election to the Junior grade (whether actually elected then or later is immaterial); (2) actively engaged in forestry as defined in Bylaw 7; (3) demonstrated his competence as a professional forester.

"Qualifying forestry experience" means experience which requires the application of professional forestry knowledge. It includes all activities having to do with the management of forest land and any of its resources. As stated in Bylaw 7, b: "Forest land is any land on which trees are the principal crop or cover, or on which it is proposed to produce trees as the principal crop or cover, or land which forms an integral part of such forest land in management of said land, or land on which erosion control is practiced or planned with the aid of forest trees, or grazing land which forms part of an administrative unit whose principal function is forestry, or land on which game management is practiced in connection with forestry, or any similar lands on which the forest is an integral and dominant feature. Forestry work shall therefore include, for Members, the following activities as above qualified: arboriculture and municipal forestry; park management; recreational management; grazing; wildlife; protection, including erosion, fire, insect, and disease control; streamflow regulation, including chaparral areas; silviculture; forest management and ad-

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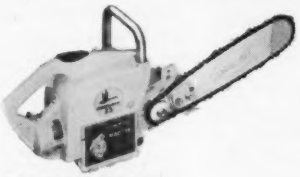
For sawlogs or pulp, for hard or soft woods, you'll be able to select exactly the right combination of features and price from this group of professional-quality McCulloch saws.



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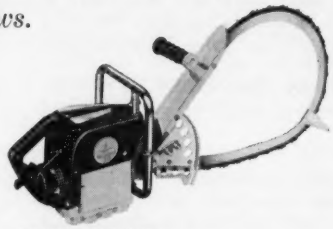

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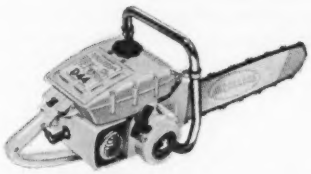

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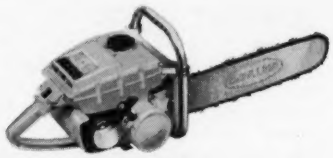

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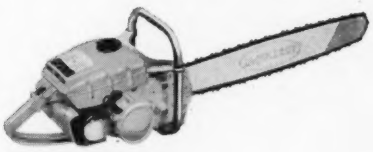

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ministration; forest utilization including logging, manufacturing, and sale of products; research in any or all of the above fields; teaching in any of the above fields; office, supervisory, or administrative duties in any of the above fields." Activities that "have nothing to do with forest land, such as the administration of grazing on the nonforested public domain, wildlife management concerned only with prairie or waterfowl management unrelated to forests, or erosion engineering in treeless regions," do not qualify as experience for the Member grade.

Bylaw 7 says: "Competence as a professional forester is the basic requirement." This means competence to perform duties of a professional character, to accept responsibility, to represent the Society and the profession in relations with others, and adherence to high standards of professional conduct.

Section officers and membership committees should encourage Junior Members to apply for advancement to the Member grade as soon as they are eligible. Junior Members are eligible to apply just as soon as they have had a minimum of three years of qualifying forestry experience after becoming eligible for election to the Junior grade. Graduates of approved curricula in accredited forestry schools are *eligible* for election to the Junior grade on the day they receive their diplomas. Hence, they are eligible for advancement to the Member grade as soon as they have three years of forestry experience since graduation, if they have been elected to the Junior grade in the meantime.

Junior Members applying for advancement should complete the first six items of an application form, which should be supported by statements of endorsement by three voting members and, if approved, endorsed by the Section.

If, at the end of six years of Junior Membership, an application for advancement has not yet been submitted, the Junior Member's Section officers are notified by the Society office. The Section officers should then ascertain whether or not the Junior Member in question meets the requirements for advancement. If he does, the Section should request the Junior Member to complete the first six items on the application form; and the Section should add its endorsement in item 7.

If the Junior Member fails to make application himself, the Section should submit the information called for—name, present position, and address—and provide endorsement.

Note that the failure of a Junior Member to complete an application does not bar the Section from endorsing him for "automatic" advancement, if he qualifies for the Member grade. Additional endorsements by three voting members are not required.

Member to Fellow

(Constitution Art. III, Sec. 7)

Advancement to the Fellow grade is by vote of the Council, Fellows, chairmen of the Sections, and the chairmen of the Subject Divisions. Elections are by letter ballot at two-year intervals in connection with the biennial election of the Council held in odd-numbered years. To be elected Fellow, a candidate must receive the affirmative vote of not less than 50 percent of the total number of votes cast.

Nomination for the grade of Fellow is made by the written endorsement of 25 Members and/or Fellows in good standing. An acceptable form of petition is as follows:

"We, the 25 or more undersigned Members and/or Fellows of the Society of American Foresters, hereby nominate (*name of person nominated*) for election to the grade of Fellow in (*year*)."

A separate petition is required for each Member nominated. Each petition must be accompanied by a biographical sketch of the candidate containing not more than 300 words giving a brief account of his professional career and accomplishments.

The Fellow grade is awarded only to Members recognized generally throughout the profession as persons who have rendered outstanding service to forestry and to the Society.

General Information

Application Form

Candidates applying for any grade of membership, including reinstatement and advancement, should use the standard membership application. On page 4, of the form, are briefly outlined requirements for the several grades of membership. Where endorsement of voting members and/or Section is required and cannot be secured locally, the executive office will obtain it.

The method of Section endorsement may be prescribed by the Section.

Endorsement Forms

Voting members who are asked to complete endorsement forms in behalf of any applicant for admission or advancement should use care and judgment in providing the information requested. Endorsers should first familiarize themselves with the requirements of the mem-

bership grade for which application is being made.

If the endorser believes that the candidate meets the requirements, he should endorse the application. If he believes that the applicant does not meet the requirements, he should so state. It it the responsibility of every member to maintain the level of eligibility intended in each membership grade.

Endorsers should state fully and specifically on the endorsement form why they believe the applicants are qualified. Especially important is the applicant who is substituting forestry experience for education. When such applicants are not approved, the reason may not be lack of qualification, but lack of evidence.

Election Procedure

All applications are submitted to the Society office for vote by the Council. Action is taken as of the month following the month of issue of the JOURNAL OF FORESTRY in which the applicants' names appear.

Through authority delegated by the Council, the Executive Secretary may declare the following applicants elected, unless an election is protested, in which case the whole Council reviews the case. (1) Student Members; (2) Junior Members, Class A; (3) Affiliate Members, Class A and Class C; (4) applicants for reinstatement; and (5) "automatic" advancements to Member grade.

For all other applicants, the Council may delegate its authority to a Council committee of three, appointed by the President. The unanimous vote of this Council committee is required to elect an applicant; a split vote by the committee requires consideration by the whole Council. In this event, eight affirmative votes are necessary to elect. An application rejected on a second ballot by the Council cannot be resubmitted until after twelve months.

All candidates are notified promptly by the Executive Secretary of the action taken on their applications.

Dues and Fees

(Constitution Art. V; Bylaws 36-40)

Dues are payable in advance on a calendar-year basis. Statements of annual dues are sent to all members on or before January 1 and must be paid by June 30. Members whose dues remain unpaid on July 1 are notified that they are in bad standing, are ineligible to vote or receive the Society's publications, and cannot be candidates for office until their dues are paid. Members whose dues remain unpaid on November 30 are dropped from membership. However, if dues for the current year are paid during December it is not necessary for a member to apply for reinstatement in order to be restored to good standing.

Student Member applicants must submit their dues for the current calendar year with their applications. Candidates for other grades of membership receive dues memoranda (applicable to the remainder of the year in which they are elected) at the time they are notified of their election. Dues of new members are payable during the quarter-year in which they are elected.

An admission fee of $5 is assessed a new member in the following grades: Junior (if not advanced from the Student grade during the calendar year of graduation), Affiliate, and Associate. Student Members who are advanced to the Junior grade during the year in which they graduate are not required to pay an admission fee or Junior Member dues for that year.

Dues of Junior Members, advanced from the Affiliate grade shall be based on the date of their election to Affiliate membership.

Annual membership dues are as follows:

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PRESSURE TYPE TREE INJECTOR

For deadening of undesirable hardwoods we offer our Pressure type Tree Injector—The Chemical is carried in a Pressure Tank (the pressure tank from our Tree Marking Gun) on the operator's back. It is connected to the Injector by the small, flexible, high quality hose. There is a small hole through the tool steel chipping bit which introduces the Chemical, UNDER PRESSURE, directly into the lip of the hack. When hack is made, the operator pulls a conveniently located trigger to inject a "shot" of Chemical exactly where you want it—and without waste—

As the operator moves around the tree he hacks, pulls the trigger for injecting the Chemical, moves over, hacks, pulls the trigger and so on around the tree, either for a continuous frill or for skip hacking. When he has completely circled the tree, the job is complete—

With this tool the operator works in an upright position at all times—no stooping over—

The Hacks are made near the base of the tree for best complete-deadening results—

One charge of tank sufficient to treat 200-300 average size trees—

PRICES

Complete Unit Stainless Steel Tank	Complete Unit Mild Steel Tank	Injector Only
$52.25	$46.75	$29.75

If you already have a PANAMA Tree Marking Gun you need only order the Injector. Just disconnect the Hand-piece from the Tree Marker and connect the hose onto the Injector, fill tank with Chemical and you are ready for operation.

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Student	$ 3	per year.
Junior and Affiliate	$ 6	per year during the first three years in this grade.
	$ 9	per year during the next three years in this grade.
	$12	per year thereafter.
Member	$12	per year during the first six years in this grade.
	$15	per year thereafter.
Fellow	$15	per year.
Associate	$ 9	per year.
Corresponding	None.	
Honorary	None.	

Definition of Approved Curriculum

For a curriculum to be approved it must include not less than one 3 quarter-credit course in each of the following subjects; silviculture, forest management, forest protection, forest economics, and wood utilization.

A graduate of an accredited forestry school but not of an approved curriculum is eligible for Junior Membership only if his application is accompanied by a statement from his dean specifying that he has completed the basic forestry courses which must be included in an approved curriculum, and listing them in detail.

A graduate of an accredited forestry school who has not completed an approved curriculum and has not taken all the required basic forestry courses is not eligible for election to the Junior grade. Such graduates may apply for the Affiliate grade, Class C, provided they have majored in wood utilization, wood technology, wildlife management, or range management.

Inactive Status
(Bylaws 39, 40)

Members may request that they be placed on inactive status while in military service. Upon return to civilian life, an inactive member should promptly notify the Society office so that he may be restored to active status. While on inactive status, the individual is considered to be a member of the Society, but does not receive the JOURNAL OF FORESTRY and cannot vote.

In special cases, upon a Section's recommendation, the Executive Secretary may place other individuals on inactive status. The Council may also remit a member's dues under special circumstances.

Retired Status
(Constitution Art. V; Sec. 4)

Members (formerly called Senior Members) and Fellows who retire from active forestry practice,[1] after having been members of the Society for 20 years or more, may upon application to the Council continue as voting members but have their dues remitted except for an annual charge of $5 should they desire to receive the JOURNAL OF FORESTRY and other Society publications. Members granted such retired status continue to pay Section dues, unless the Sections concerned waive such payment.

Termination of Membership
(Constitution Art. IV, Sec. 6
Bylaws 22-32, 34)

Membership may be terminated by (1) resignation while in good standing, (2) resignation while dues are in arrears, (3) nonpayment of dues, (4) expulsion for unprofessional conduct.

To resign while in good standing, a member must resign during the year for which his dues are paid or not later than January 31 of the following year. The effective date of resignation is either

[1]Interpreted as applying to members retired from full-time employment, either in forestry or other fields.

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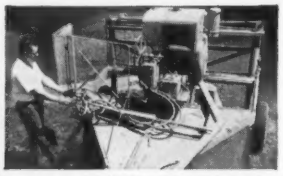

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December 31, or the date the resignation is submitted, as the member wishes, but no dues can be refunded. Members who resign during February or a later month, if their dues for the current year have not been paid, are considered to have resigned while their dues are in arrears.

Members may be expelled for unprofessional conduct according to procedures outlined in Article IV, Sec. 5 and Bylaws 24-32.

Reinstatement
(Bylaws 33-35)

Former members may be reinstated to their former grades upon application by paying back dues owed, if any, together with current dues. Members dropped for nonpayment of dues or who resigned in arrears need pay back dues only for the period in which they became delinquent. In no case will back dues exceed six months payment.

Former members who wish to know how much they owe for back dues should contact the Society office. Back Section dues are not collected by the Society office, although current Section dues are collected.

Members dropped for nonpayment of dues while serving in the armed forces are exempted from the necessity of paying back dues.

Voting Members

Only Junior Members, Members, and Fellows are entitled to vote. More than 80 percent of the Society's total membership are voting members in these three grades.

Membership Applications and Advancements

Proposals for admission, advancement, and reinstatements received in the Society office during the month of April are listed below.

Action on the eligibility of those proposed for membership as listed below will be taken by the Council as of June 1958.

Communications from voting members regarding the membership eligibility of these persons should be received in the Society office prior to that date.

Allegheny Section

Student Grade

Dill, R. E. (Reinstatement).

Junior Grade

Wandrisco, T. A., Green Thumb Nursery, Latrobe, Pa.; Pa. State, B.S.F., 1951.

Student Eligible for Automatic Advancement

WEST VIRGINIA UNIVERSITY

Dill, R. E.

Member Grade

Hudson, W. M., Forester, Western Wash. Agency, Pacific Beach, Wash. (Junior 1953).

Nielsen, H. E., Eng., Johns-Manville Research Ctr., Manville, N. J. (Junior 1952).

Appalachian Section

Junior Grade

Diehl, P. B., Va. Tbr. Corp., Altavista, Va. (Reinstatement).

Schilling, F., Service Forester, Va. Div. of Forestry, Farmville, Va.; Yale, M.F., 1958.

Students Eligible for Automatic Advancement

NORTH CAROLINA STATE COLLEGE

Gurganus, R. F. Kunselman, M. B.
Harding, C. B. Thorne, F. L.
Wood, T. B.

Member Grade

Bell, R. W., Forester, USFS, Wytheville, Va.; Pa. State, B.S.F., 1954. (Junior 1954).

Diehl, P. B., Forester, Va. Tbr. Corp., Altavista, Va.; Pa. State, B.S.F., 1951. (Junior 1952).

Huff, J. L., Forester, Halifax Paper Co., Inc., Maysville, N. C. (Reinstatement).

Associate Grade

Plumb, G. H., Charlottesville, Va. (Reinstatement).

Central Rocky Mountain Section

Student Grade

COLORADO STATE UNIVERSITY

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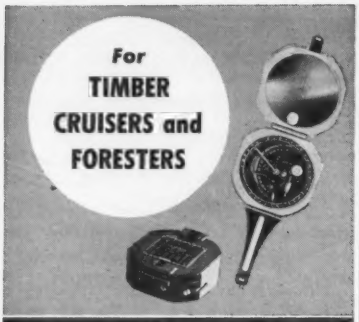

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Joder, R. M.
Lees, J. A.
MacIntyre, D. C.
Newlin, R. P.
Tabler, R. D.

Junior Grade

Siewert, G. W., Forester, USFS, Kremmling, Colo. (Reinstatement).

Student Eligible for Automatic Advancement

COLORADO STATE UNIVERSITY

Barry, C. R.

Member Grade

Gallagher, D. G., Ass't District Forest Ranger, USFS, Idaho Springs, Colo.; Colo. State, B.S., 1954. (Junior 1954).

Hall, A. F., General Mgr., USFS, Mesa Verde Enterprise Inc., Colo. (Reinstatement).

Central States Section

Student Grade

PURDUE UNIVERSITY

Nelson, M. E.

Junior Grade

Gould, R. J., Mich. State, B.S.F., 1955. (Student 1954).

Member Grade

Jepsen, S. M., Assoc. Editor, *The Timberman* and *The Lumberman*, Chicago, Ill., University of Idaho, B.S.F., 1954; M.F., 1955. (Junior 1954).

Affiliate Grade

Rippe, J. D., Forest Ranger, Ohio Div. of Forestry, Zaleski, Ohio.

Columbia River Section

Student Grade

OREGON STATE COLLEGE

Barton, E. R.

Junior Grade

Peairs, R. S., Forester, Oregon State Board of Forestry, Coos Bay, Ore., University of Idaho, B.S., 1952. (Junior 1952).

Semmler, W. H., Unit Logging Supt., U. S. Plywood Corp., Roseburg, Ore.; Ore. State, B.S.F., 1941.

Member Grade

Dawson, F. S., Coos Bay Pulp Co., Coos Bay, Ore. (Junior 1951).

Holloter, G. C., Forester, USFS, Parkdale, Ore., Ore. State, B.S. (Forest Mgmt.), 1954. (Junior 1954).

Kerriek, M. A., Dist. Asst., Blue River Ranger Dist., Blue River, Ore., Univ. of Minn., B.S.F., 1954. (Junior 1954).

McAvoy, T. F., Forester, U. S. Indian Service, Nespelem, Wash. (1951).

Stockton, A. L., Property Appraiser, Ore. State Tax Comm., Salem, Ore., Mont. State, B.S.F., 1951. (Junior 1951).

Gulf States Section

Student Grade

LOUISIANA STATE UNIVERSITY

DuBarry, A. P. Faualoro, F. T.

LOUISIANA POLYTECHNIC INSTITUTE

Williams, B. H.

Junior Grade

Aycock, O. E., Forester, USFS, Winnfield, La., L.P.I., B.S.F., 1954.

Davis, B. E., Exec. Sec., Miss. Forestry Assoc., Jackson, Miss. (Reinstatement).

Neal, R. L., USFS, Research Forester, New Orleans, La. (Reinstatement).

Students Eligible for Automatic Advancement

LOUISIANA STATE UNIVERSITY

Cole, B. R.
Foster, G. W.
Gaddis, B. T.
Gillespie, K. L.
Saucier, J. R.
Stout, C. W.

Member Grade

Crowther, C. E., Wildlife Research Biologist, U. S. Fish & Wildlife Serv., Vicksburg, Miss., La. State, M.S., 1951. (Junior 1954).

Darsey, F. E., Unit Forester, Int'l Paper Co., Jena, La., L.P.I., B.S.F., 1950. (Junior 1954).

Davis, B. M., Asst. Dist. Forester, Nebo Oil Co., Inc., Good Pine, La., L.P.I., B.S.F., 1954. (Junior 1954).

Fallin, F., Woodland Cons., Soil Conservation Serv., Ruston, La., L.P.I., B.S.F., 1950. (Junior 1954).

Futch, J. M., Manager, Bienville Pulpwood Co. Inc., Arcadia, La., L.P.I., B.S.F., 1950. (Junior 1954).

Jackson, W. B., Forester, USFS, Quatre Parish Co., Kinder, La., La. State, B.S.F., 1954. (Junior 1954).

Leachman, J. C., Cons. Forester, Delta Region Int'l Paper Co., Alexandria, La., L.P.I., B.S.F., 1950. (Junior 1954).

Martin, J. H., Unit Forester, Int'l Paper Co., Jena, La., L.P.I., B.S.F., 1948. (Junior 1954).

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Miller, I. W., Forester, USFS, Forestry Suppliers, Inc., Jackson, Miss., University of Ga., B.S.F., 1932. (Junior 1954).

Richardson, R. E., Forester, Industrial Lbr. Co., Elizabeth, La., La. State, B.S.F., 1952. (Junior 1954).

Russell, E. F., Forester, Calcasieu Paper Co., Inc., Elizabeth, La., L.P.I., 1953.

Walsh, D. H., Logging Supt., Olin Mathieson Chemical Corp., Winnfield, La., L.P.I., B.S.F., 1949. (Junior 1954).

Weaver, B. W., Area Forester, Gaylord Container Corp., Talisheek, La., La. State, B.S.F., 1952. (Junior 1954).

Affiliate Grade

Brewer, N. W., Resident Supv., Scott Paper Co., Mobile, Ala.

Power, H. L., U. S. Army, A.P.O., San Francisco, Calif.

Steitz, H. E., Asst. Forester, Texas Forest Serv., Henderson, Texas.

Inland Empire Section

Student Grade

UNIVERSITY OF IDAHO

Reveley, T. L.

Member Grade

Edinger, W. R., Asst. Dist. Ranger, Falls Ranger Station, Priest River, Idaho, Pa. State, B.S.F. 1951. (Junior 1954).

Martin, J. W., Forester, Pack River Lumber Co., Sandpoint, Idaho. (Junior 1951).

Ohs, C. A., Farm Forester, Idaho Dept. of Forestry, Sandpoint, Idaho, University of Idaho, B.S.F., 1954. (Junior 1954).

Rauch, G. H., Vice President of Lands, Logging & Forestry, Potlatch Forestry Inc., Lewiston, Idaho, Pa. State, B.S.F., 1936. (Junior 1954).

Smith, L. O., Forester, Coeur d'Alene National Forest, Coeur d'Alene, Idaho, University of Idaho, B.S.F., 1954. (Junior 1954).

Intermountain Section

Member Grade

Anderson, D. V., Forester, Boise Cascade Corp., Cascade, Idaho, University of Idaho (Forest Mgmt.), 1950. (Junior 1954).

New England Section

Student Grade

UNIVERSITY OF MAINE

Kurrle, F. L.

YALE UNIVERSITY

Swearingson, J. W.

Junior Grade

Barton, D. C., County Forester, Dept. Forests & Parks, Bennington, Vt. (Reinstatement).

Holt, L., Asst. Forester, Mersey Paper Co., Ltd., Liverpool, Canada. (Affiliate 1953).

Johnson, D. M., Resident Mgr., Canada Int'l Paper Co., Quebec, Canada, Yale, M.F., 1949.

Southard, H. R., Industrial Forester, Rutland, Vt., Univ. of Mich., M.F., 1951.

Student Eligible for Automatic Advancement

UNIVERSITY OF MASSACHUSETTS

Blomstrom, G. H.

Member Grade

Atkinson, O. R., Research Forester, Northeastern Forest Expt. Sta., Univ. of Maine, B.S.F., 1954. (Junior 1954).

Hughes, L. L., Forest Officer, Dept. of Northern Affairs & Nat'l Resources, Fredericton, New Brunswick, Canada, Univ. of Mich., M.F., 1953. (Junior 1954).

Whittemore, D. K., Forester, Int'l Paper Co., North Stratford, N. H., Yale, M.F., 1955. (Junior 1952).

Affiliate Grade

Mitchell, R. W., Asst. Chief, Brown Co., Berlin, N. H.

Monahan, T. J., Forester, Granite State Veneer Inc., N. Stratford, N. H.

New York Section

Junior Grade

Higgins, P. F., Junior Forester, N. Y. State Cons. Dept., Catskill, N. Y., Univ. of Maine, B.S.F., 1954.

Risley, J. H., Forest Biologist, N. Y. State Cons. Dept., Albany, N. Y., State Univ. of N. Y., B.S.F., 1952.

Northern California Section

Junior Grade

Students Eligible for Automatic Advancement

UNIVERSITY OF CALIFORNIA

Carson, R. D. Poppin, N. J.
Knauf, W. L. Skolmen, R. G.
Larson, L. J. Winter, E. R.
Zittel, H. F.

Member Grade

Arnold, P., 660 Hegenberger Road, Oakland, Calif. (Junior 1951).

Burtchett, G. W., 2760 Pacific Ave., Arcata, Calif. (Junior 1951).

Callahan, R. Z., Box 245, Berkeley 1, Calif. (Junior 1951).

Carlson, C. E., 2307 Cathay Way, Sacramento 1, Calif. (Junior 1951).

Carlson, Lt. F. J., 371 30th Street, Oakland 9, Calif. (Junior 1951).

Cermak, R., Quincy, Calif. (Junior 1951).

Cope, R. H., Recreation Asst., Sierra Nat'l Forest, Big Creek, Calif., Univ. of Calif., B.S.F., 1954. (Junior 1954).

Davidson, A. C., Box 18, Westwood, Calif. (Junior 1951).

DeVoe, A. H., P. O. Box 891, Arcata, Calif. (Junior 1951).

Fielding, J. E., Box 1134, Rio Vista, Calif. (Junior 1951).

Glunt, T. E., c/o Shasta Forests Co., Box 898, Redding, Calif. (Junior 1951).

Goldsmith, W. H., 13 Cameo Ave., Weed, Calif. (Junior 1951).

Gorrell, J. W., Forester, USFS, Chester, Calif., Univ. of Calif., M.S.F., 1957. (Junior 1954).

Hall, D. O., 1744 Va. Street, Berkeley 3, Calif. (Junior 1951).

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Hall, G. H., P. O. Box 116, Stirling City, Calif. (Junior 1951).

Hallett, A. F. E., 1834 14th Street, Eureka, Calif. (Junior 1951).

Helm, R. E., 3600 Seminary Ave., Oakland 5, Calif. (Junior 1951).

Hoerr, R. C., Wood Buyer, Fibreboard Paper Prod. Corp., Univ. of Calif., M.S.F., 1957. (Junior 1954).

Hopkins, H. E., 667 West Miner Street, Yreka, Calif. (Junior 1951).

Hughes, W. C., 6408 Fair Oaks Blvd., Carmichael, Calif. (Junior 1951).

Jacobson, W. T., 2235 Weldon Ave., Fresno 3, Calif. (Junior 1951).

Jensen, A. W., 1607 Bonita, Berkeley 9, Calif. (Junior 1951).

Land, H. C., P. O. Box 158, Mendocino, Calif. (Junior 1951).

Maule, W. M., Dist. Ranger, USFS, Pollock Pines, Calif., Ore. State, B.S.F., 1950. (Junior 1951).

Quadro, F. E., P. O. Box 33, Bridgeville, Calif. (Junior 1951).

Reynolds, R. D., 1913 Divisadero, San Francisco 15, Calif. (Junior 1951).

Rice, R. M., 104 Lockwood Drive, Pleasant Hill, Calif. (Junior 1951).

Saukko, R. W., 3312 Freese Ave., Eureka, Calif. (Junior 1951).

Schmidt, F. F., Box 838, Arcata, Calif. (Junior 1951).

Schoening, J. R., 1539 Willis, Redding, Calif. (Junior 1951).

Scott, E. L., 732 Fickle Hill Road, Arcata, Calif. (Junior 1951).

Snow, G. H., 2606 Spring Creek Dr., Santa Rosa, Calif. (Junior 1951).

Sweeley, J. P., Masonite Corp., Ukiah, Calif., (Junior 1951).

Ten Eyck, R. A., c/o Western Tbr. Serv., Arcata Hotel Bldg., Arcata, Calif. (Junior 1951).

Theuerkauf, E. H., 1515 G Street., Eureka, Calif. (Junior 1951).

Northern Rocky Mountain Section

Student Grade

MONTANA STATE UNIVERSITY

Brigham, D. T. Sartz, C. L.
McCullough, W. G. Schlueter, H. L.
Stone, C. O.

Member Grade

Fellin, D. G., Entomologist, Forest Insect Laboratory, Missoula, Mont., Univ. of Idaho, B.S.F., 1952. (Junior 1952).

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Ozark Section

Junior Grade

Bylsma, J. E., Forester, USFS, Waldron, Ark., Purdue, B.S.F., 1949.

Reese, E. A., Dist. Supv., Int'l Paper Co., Sheridan, Ark. (Affiliate 1955).

Watts, B. E., Asst. Dist. Ranger, USFS, Oden, Ark. (Affiliate 1954).

Member Grade

Haynes, C. O., Unit Forester, Int'l, Paper Co., Waldron, Ark., La. State, B.S.F., 1951. (Junior 1954).

Kurz, J. Q., Wood Procurement Supt., Dierks Paper Co., Pine Bluff, Ark. (Junior 1954).

Ross, H. L., Forest Mgmt., Ark. State Forestry Comm., Camden, Ark., Iowa State, B.S.F., 1951 (Junior 1954).

Puget Sound Section

Junior Grade

Hoberg, W. E., Chief Eng., Dept. of Natural Resources, Beaver, Wash., Univ. of Wash., B.S.F., 1951.

Member Grade

Lewis, H. B., Staff Asst., Weyerhaeuser Tbr. Co., Chehalis, Wash., Univ. of Wash., B.S.F., 1951. (Junior 1954).

Murdock, W. G., Administrative Asst., Div. of Forest Eng., Olympia, Wash., Univ. of Wash., B.S.F., 1950.

Scheider, E. C., 4407 Upland Dr., Yakima, Wash. (Junior 1951).

Stover, A. E., Forester, 4719 16th St., N. E. Seattle, Wash., State Univ. of N. Y., B.S.F., 1953. (Junior 1953).

Tessier, J. P., Eng. Asst., MacMillan & Bloedel, Sarita River, B. C., Yale, M.F., 1954 (Junior 1954).

Affiliate Grade

Hasko, J. A., Mgmt. Forester, State Dept. of Natural Resources, Beaver, Wash.

Southeastern Section

Junior Grade

Ball, D. E., Area Forester, Gair Woodlands Corp., Jasper, Fla., W. Va. Univ. B.S.F., 1953.

Student Eligible For Automatic Advancement

ALABAMA POLYTECHNIC INSTITUTE

Nichols, N. G.

Member Grade

Lahr, J. D., Senior Forester, Ga. Kraft Co., Macon, Ga., Purdue, B.S.F., 1951. (Junior 1951).

Smith, J. W., Research Forester, Union Bag-Camp Paper Corp., Savannah, Ga., State Univ. of N. Y., B.S. (Forest Mgmt.), 1953, M.F. (Forest Mgmt.), 1957. (Junior 1954).

Southwestern Section

Junior Grade

Carroll, F. O., Forester, USFS, Luna, N. Mex. (Reinstatement).

Upper Mississippi Valley Section

Student Grade

IOWA STATE COLLEGE

Bodenberger, P. E. Tompkins, G. L.
Lauritsen, M. K.

UNIVERSITY OF MINNESOTA

Nelson, J. A. — Dodge, R. E. (Reinstatement).

Junior Grade

Batzer, H. O., Entomologist, USFS, Grand Rapids, Minn. (Reinstatement).

Dodge, R. E., Iowa State College, B.S.F. June 1957.

Grove, J. O., Forester, Range Resources & Rehabilitation, Hibbing, Minn. (Reinstatement).

Larson, A. C., Asst. Forester, Minn. & Ontario Paper Co., International Falls, Minn., Univ. of Minn., B.S.F., 1951.

Plum, B. E., Forester, USFS, Farmington, Iowa, Iowa State, B.S.F., 1950.

Student Eligible For Automatic Advancement

UNIVERSITY OF MINNESOTA

Stone, N. W.

Member Grade

Bergh, T. K., Woodland Conservationist, Soil Conservation Serv., St. Cloud, Minn. (Reinstatement).

Gatherum, G. E., Asst. Prof. of Forestry, Iowa State, Ames, Iowa, Iowa State, Ph.D. (Junior 1954).

Wisconsin-Michigan Section

Student Grade

MICHIGAN COLLEGE OF MINING & TECHNOLOGY

LaBumbard, H. H.

MICHIGAN STATE UNIVERSITY

Bilecky, A. — Grothnan, R. E.
Blattner, F. J. — Taylor, W. E.
Gibbons, C. F. — Terhune, W. S.

UNIVERSITY OF MICHIGAN

Hertrich, G. A.

Junior Grade

Hillberg, L. A., Dist. Forester, Kimberly-Clark, Munsing, Mich., Univ. of Mich., B.S.F., 1939.

Andreski, J. L., Forestry Aid, USFS, Iron River, Mich. (Affiliate 1947).

Students Eligible for Automatic Advancement

MICHIGAN STATE UNIVERSITY

Garrett, P. W. — Kovalic, P. P.
Hudspith, J. E. — Peer, W. C.
Tobolski, J. J.

UNIVERSITY OF MICHIGAN

Trefts, H. — Erlanger, J. J.

Member Grade

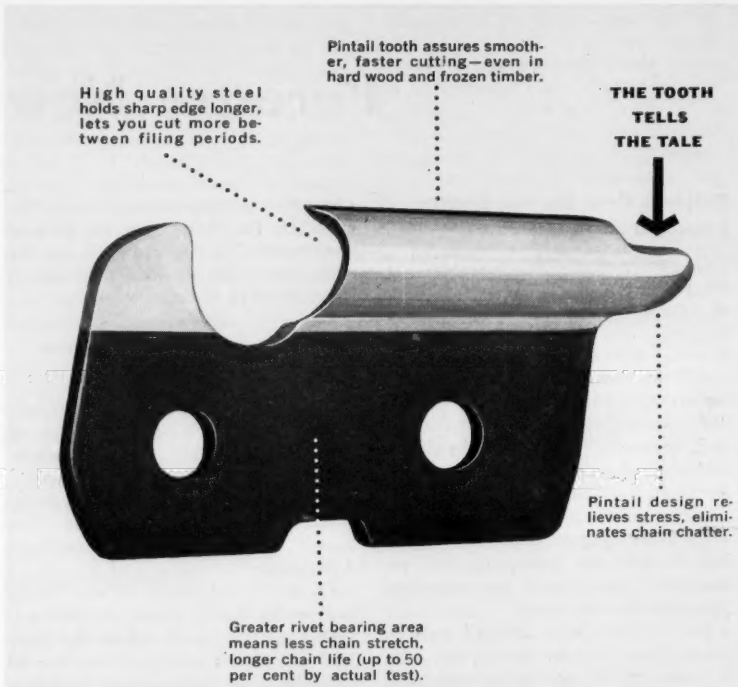
Walton, S. A., Forester, Koppers Co., Inc., Marietta, Ohio, Pa. State, B.S.F., 1951. (Junior 1951).

No Section

Corresponding Grade

Ray, Prabir Kumar, 11/49 Panditta Road, Calcutta 29, India. Deputy Conservator of Forest, West Bengal, India, Presidency College, B.S., (Botany), 1945. Indian Forest College, Forestry & Allied Subjects, Diploma, 1948.

Kolman, Vladek, Forester, Prentiss & Carlisle Co., Inc., Bangor, Maine.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Forestry News

National Civil Service League Award to R. E. McArdle

Dr. Richard E. McArdle, chief of the U. S. Forest Service, Department of Agriculture, has been chosen by the National Civil Service League as one of the 10 top career people in the Federal Government. The winners selected from nearly 100 entries from 31 federal agencies, were judged outstanding civil servants "by their competence, efficiency, character, and continuity of service."

A non-partisan citizens group, the 77-year-old League originally organized to fight the political spoils system, now concentrates on improving the Civil Service system.

Dr. McArdle, who has had over 20 years of government service, has been a leader in the development and improvement of the nation's forests. He is especially noted for "his work in conservation made possible by friendly and effective cooperation between the Industry, the States, and the Federal Government." The award cited him for "exceptional ability and professional competence in the career service."

Forest Designated to Preserve Oldest Living Things

Methuselah Walk and the surrounding area in the White Mountains of Inyo County, Calif., which contain the oldest living things on earth—bristlecone pine trees—have been designated the Ancient Bristlecone Pine Forest by the U. S. Department of Agriculture.

Chief R. E. McArdle of the Forest Service, in April, signed an order establishing the forest within the Inyo National Forest and providing for its administration for botanical and historical purposes and for public enjoyment.

The area designated includes 27,000 acres along the crest of the White Mountain Range. It lies east of Owens Valley. Within it are 100 bristlecone pines over 4,000 years old and thousands in the 3,000-4,000 age bracket.

A grove of the oldest trees will be named the Edmund Schulman Memorial Grove in honor of the man who discovered that the ancient bristlecones were the oldest living things in the world. The late Mr. Schulman and M. E. Cooley of the University of Arizona were working on a grant from the National Science Foundation when they discovered the age of the grove in 1957. The discovery culminated 20 years of research by Mr. Schulman among old trees. His findings aroused widespread public interest when recently reported by the National Geographic Society.

Increase in Amount of Wood Treated with Preservatives Reported

More wood was treated with preservatives at commercial plants in 1957 than in 1956, according to preliminary statistics compiled by the U. S. Forest Service and the American Wood Preservers' Association.

The preliminary report, based on information from 318 of the 357 known wood treating plants, shows that 259.5 million cubic feet of wood were treated in 1957—2 million cubic feet more than in 1956. It is expected that the total amount treated will reach 270 million cubic feet when final reports are in.

Of wood treated, 98 million cubic feet were used for crossties. The rest of the treated wood was in poles, lumber and timbers, posts, piling, switchties, crossarms, and wood blocks.

In 1957, some 177,158,300 gallons of creosote and coal tar were used in wood treatments, an increase of 5 percent over 1956. Among solid preservatives, pentachlorophenol ranks first with about 11,166,570 pounds used, a decrease of 15 percent from 1956.

Pulpwood Industry Showed Stability in 1957

Consumption of pulpwood in 1957 dropped less than 1 percent to 35,662,000 cords, only 87,000 cords less than the peak reached in 1956, according to W. S. Bromley, executive secretary, American Pulpwood Association. Most

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of the drop occurred in the Northwest and the Lake States. Southern mills showed about the same use of pulpwood as in the previous years, while western mills showed a 1 percent increase. The use of chips, slabs, and other woods and mill leftovers accounted for 12 percent of total pulpwood receipts in 1957, the West consuming twice the volume of such material as all other regions.

Education

Colorado State Gets $50,000 Grant for Watershed Management Program

A grant of $50,000 to help initiate a complete, full-fledged instruction and research program in watershed management has been made to Colorado State University. Announcement of the grant was made jointly by William E. Morgan, president of the University, and Arthur N. Pack, president of the Charles Lathrop Pack Forestry Foundation, which made the grant.

Details of the program will be worked out by University officials and Tom Gill, Washington, D. C., executive director of the foundation. The program calls for establishment on July 1, 1958, of a watershed management unit as an integral part of the College of Forestry and Range Management at the University.

In addition to the grant by the Pack Foundation, assistance will be given by the U. S. Forest Service through the Rocky Mountain Forest and Range Experiment Station which is headquartered on the campus. Raymond Price, director of the station, states that Forest Service personnel will participate in research activities of graduate students enrolled in the unit.

The unit is expected to help fill a need acutely felt by municipalities, industry, and government agencies for watershed management specialists with advanced training.

Clinton H. Wasser is dean of the College of Forestry and Range Management at Colorado State.

LSU Professor Receives Science Fellowship

A National Science Foundation faculty fellowship of $1,000 has been awarded to A. Bigler Crow, associate professor of forestry at Louisiana State University, according to Dr. Paul Y. Burns, director of the School of Forestry.

Purpose of the Science Faculty Fellowships is to provide an opportunity for college and university science teachers to enhance their effectiveness as teachers.

The award will enable Crow to travel throughout the southern pine region to gather first-hand information on pine management as preparation for writing a textbook. While on sabbatical leave, he will survey the research activities, fire control techniques, seeding and planting operations, and cutting practices of public and industrial forest areas in all of the southern states.

Harold E. Young to Do Research for Air Force

Harold E. Young, associate professor of forestry at the University of Maine, has been granted a year's leave of absence in order to serve as a civilian scientist with the Operations Analysis Office of the North American Air Defense Command in Colorado Springs, Colo.

Dr. Young will begin his duties on September 1.

A graduate of the University of Maine, Dr. Young received his M.F. and Ph.D. degrees from Duke Univer-

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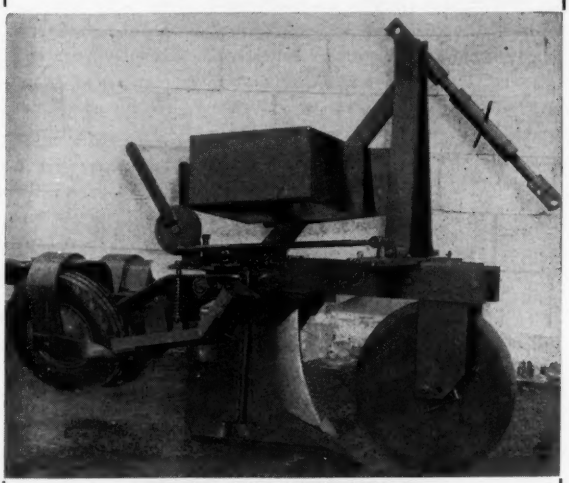

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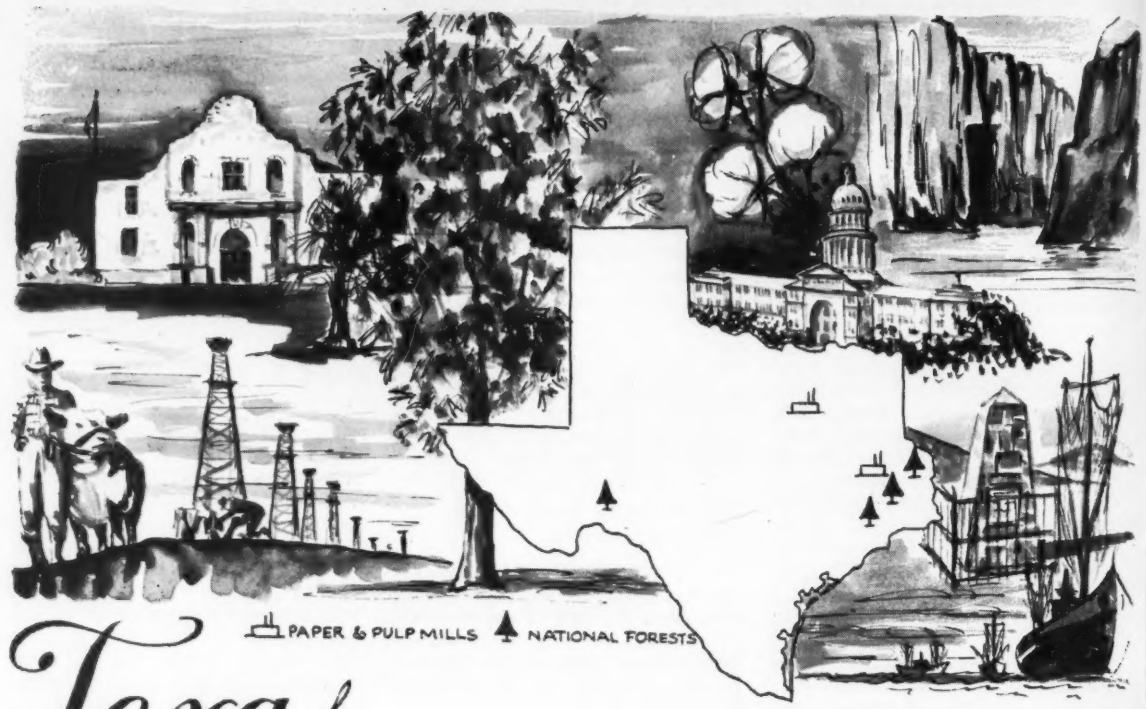

Texas

Texas is the cross-road of four of the major tree regions of the United States. To the North are the post oak and cross-timber areas, a part of the central hardwood belt. In the West are the mountain forests, representing a part of the Rocky Mountain system. Major species are pinon pine, western yellow pine and Douglas fir. Trees such as huisache, black persimmon, ebony, and guaiacum which thrive in arid climates are found in South Texas. Lastly is the southern pine forest region in the eastern portion of the State.

Of the tree regions, the one of major importance is the East Texas piney-woods area embracing 12,172,000 acres of commercial forest land. It was in this region that the State's lumber industry was born in the early 1800's. Lumber production alone in 1956 exceeded 1,145,000 board feet.

The 1600 forest industries of the State furnish employment to an estimated 50,000 people, whose aggregate income and profits total over $200,000,000. Value of forest products produced annually amounts to about $537,000. Forest products industries comprise about 18 per cent of Texas' industrial plants and employ about 14 per cent of all active industrial labor.

Nothwithstanding the fact that trees have been cut for over a century in the commercial pine-hardwoods area, these forests are still productive. Actually, there was a greater volume of timber available in 1956 than in 1935. This is based on forest surveys conducted during these two periods. Further, the forest area increased by 9 per cent in this same interval.

East Texas' commercial forest area will continue to contribute to the economy of Texas and provide wood and wood products for a growing population.

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sity. He joined the Maine faculty in 1948.

Forest Economist on Far East Study

Ronald Beazley, associate professor of forest economics, School of Forestry, University of Minnesota, took leave of absence in April to extend through October 1958 for the purpose of heading a study of the timber requirements, forest resources, and forest industries of the Far East. He will be attached to the Division of Research and Planning, Secretariat of the United Nations Economic Commission for Asia and the Far East, Bangkok, Thailand. The study will be conducted jointly by the FAO and the Economic Commission for Asia and the Far East.

Public

L. L. Colvill, Fire Specialist, Retires

Regional Forester J. Herbert Stone of the Pacific Northwest Region announced Leslie L. Colvill's retirement effective March 31 following a long and notable career as a forest fire control specialist in the U. S. Forest Service.

Mr. Colvill has received a number of awards for outstanding public service during his career. These include an award for extraordinary performance in the control of forest fires during the critical 1951 fire season. For this he was granted a Superior Accomplishment award and a Certificate of Merit by the chief of the Forest Service. In 1956 he was the recipient of a $300 cash award for outstanding service as acting chief of the Northwest regional division of fire control. On May 21, 1957, Secretary of Agriculture Benson presented Colvill with the Department's Superior Service award "for pioneer and imaginative leadership in developing and improving methods and administration of forest fire control."

Colvill began his career in 1917 on the St. Joe National Forest in Idaho. He served with the U. S. Army in France during World War I with the 20th Engineers. He received his B.S.F. degree at Montana State University. After several years with the Anaconda Company, he was appointed fire dispatcher on the Deschutes National Forest, Ore., in 1925. Successive assignments in key fire control jobs took him to the Fremont, Olympic, and Siskiyou National Forests. In 1942

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JOHN B. SMITH

he was appointed assistant chief of the division of fire control in the Pacific Northwest Region, Portland, Ore.

In 1956 he accepted a special assignment in the office of the chief of the Forest Service in Washington, D. C. for the purpose of drafting a complete revision of the fire control section of the Forest Service Manual and the national Fire Control Handbook. This is the position from which he retired on March 31, 1958.

Promotions, Transfers in Northwest Announced

The promotion of Harold S. Coons, forest supervisor of Wallowa-Whitman National Forests, and his replacement by the promotion of John B. Smith have been announced by Regional Forester J. Herbert Stone of the U. S. Forest Service. Coons became supervisor of the Whitman National Forest in 1951 and of both the Wallowa and Whitman National Forests after their administration was consolidated in 1953. Smith has been a staff officer in the Forest Service's regional division of fire control in Portland since 1957.

Coons is being promoted to a Washington, D. C. internal audit position, but he will be working out of headquarters at Portland, Ore.

The promotion of Ashley A. Poust to forest supervisor of the Deschutes National Forest in central Oregon, was effective April 14. He was transferred from the Olympic National Forest in late March this year to a staff position in the division of timber management in the regional office at Portland. Poust replaces James Egan who died March 19.

Thomas E. Greathouse has been named to a staff position in the division of timber management of the regional office at Portland. The promotion became effective in May, at which time he moved from a staff position on the Olympic National Forest.

Transfer of Wendell H. Harmon from the U. S. Forest Service headquarters of the Rocky Mountain Region at Denver, Colo., to a staff position in the division of timber management in the Pacific Northwest Region became effective April 20. Since June 1956 Harmon had been at the Denver headquarters in the divisions of information and state and private forestry, and timber management.

F. H. Dutlinger Retires

Forrest H. Dutlinger, veteran district forester of the Pennsylvania Department of Forests and Waters, recently retired after 53 years of continuous service.

Following his graduation in 1908 from the old Pennsylvania State Forest Academy at Mont Alto, he was assigned to state forest administration. During his long career, Mr. Dutlinger was in charge of several important state forest districts, supervising parks, tree nurseries, timber operations, a sawmill, and numerous related activities.

On his retirement he was district forester of the Rothrock District with headquarters at Huntingdon, Pa.

Since 1909 he has been a member of the Pennsylvania Forestry Associa-

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tion, and for 30 years a Member of the Allegheny Section, Society of American Foresters.

Carl Mayer Named Head of Forest Survey in the Northeast

Carl E. Mayer has been named head of the forest survey section, division of forest economics, at the Northeastern Forest Experiment Station, it was announced recently by Ralph W. Marquis, director of the station.

Mayer was transferred from the Pacific Northwest Forest and Range Experiment Station in Portland, Ore., where he directed timber surveys in Washington and Oregon. In his new post, Mayer will develop plans and administrative techniques for the resurvey of all forested lands in a 12-state region from West Virginia to Maine.

Mayer was graduated from Iowa State College in 1943 with a B.S. degree in forestry. During World War II, he served as a marine captain in the South Pacific. He joined the Pacific Northwest Station in 1946 after serving on the Willamette National Forest in Oregon.

Kentucky Authorizes Statewide Fire Protection

Kentucky Governor A. B. Chandler recently signed into law a bill for establishing statewide forest fire protection. The bill was sponsored by the State Division of Forestry and passed the General Assembly without a "no" vote.

The bill gives the Division of Forestry responsibility of establishing an adequate form of statewide forest fire protection. The Division is allowed five years to implement the law.

Forty-seven counties comprising seven million acres of timberland already operate under a fire protection plan. The new law will include the remaining 73 counties and four million acres of forests which at present are without fire protection.

Private & Industrial

Well Known Industrial Forester Retires

William D. Comings, who pioneered West Virginia Pulp and Paper Company's acquisition and development of pine forests in the South for use in the manufacture of kraft paper and paperboard, retired April 1 after 36 years of service. Mr. Comings was manager of the company's Woodlands Department.

A graduate of Cornell University with a degree in forestry, Mr. Comings started as a forester for the company in South Carolina. His first assignment was to purchase for the company some of its first pine forests in the South. He later organized the properties in preparation for the intensive management program now in effect.

Mr. Comings was promoted in 1931 to assistant manager of the company's Woodlands Department under Charles W. Luke, who was then head of the

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department. He was advanced to manager in 1939, and since that time has done much to make West Virginia Pulp and Paper Company one of the industry's leaders in sound forest management methods and in furthering these practices among independent land owners and pulpwood growers.

Association of Consulting Foresters Meets

Newly elected officers took over at the annual meeting of the Association of Consulting Foresters held at the Roger Smith Hotel in Washington, D. C. on April 11-12. Every section of the country is represented on the new slate, which consists of: Robert Moore of Danville, Pa., president; Verne D. Bronson of Eugene, Ore., vice president; James Craig of Jackson, Miss., secretary-treasurer. Thomas F. Schweigert of Potosky, Mich., was elected to the Executive Board. There were no changes in the other offices or in committee appointments.

Guest speaker at the dinner held on the evening of April 11th was Maryland state forester, H. C. Buckingham, who described methods of cooperation between government and consulting foresters in Maryland. The dinner was followed by the business meeting open only to members. About 25 percent of the entire national membership of the Association was present at the meeting.

Homer Lyons, Jr., Assistant Secretary Peterson's assistant in the Department of Agriculture, discussed the Administration's forestry policies at the open meeting on the morning of April 12th. A number of guest foresters attended this session. Lyons was followed by Roland Rotty, head of the U. S. Forest Service's Cooperative Planting Program, who reported on some pine planting techniques which have proved remarkably successful in semi-arid regions in Spain. A lively discussion period wound up the annual program.

Industrial Forestry Association Meets

After requesting the President of the United States to direct the federal forest agencies to sell the full sustained yield allowable cut of federal forests in Oregon and Washington to help stabilize the forest industry, the members of the Industrial Forestry Association meeting at Portland, Ore., in April elected officers and directors for 1958.

H. O. Puhn, general woods manager for the Simpson Logging Company, Shelton, Wash., was elected president and E. F. Heacox, managing forester, Weyerhaeuser Timber Company, Tacoma, vice president.

G. D. Knudson, vice president, Willamette Valley Lumber Company, Dallas, Ore., was reelected secretary and J. S. Brandis, vice president, Georgia-Pacific Corporation, Portland, reelected treasurer.

N. E. Bjorklund and W. D. Hagenstein were reelected assistant secretary and executive vice president respectively.

The Association's retiring president, Nils B. Hult, emphasized the importance of federal timber to the stability of the Northwest's No. 1 industry.

Directors elected include H. W. Freed, timber manager for Longview Fibre Company, Longview, Wash., S. V. McQueen, president of Kogap Lumber Industries, Medford, and C. W. Richen, manager of Northwest timber operations, Crown Zellerbach Corporation, Portland. The Association's other 15 Directors were all relected.

R. F. Morse and A. H. Brandis, both of Longview, were elected honorary directors, as was E. P. Stamm of Portland.

D. A. Swan Joins APA Staff as Forest Engineer

Donald A. Swan was appointed forest engineer effective April 1 to assume responsibility for the Portland, Maine Office of the American Pulpwood Association. J. S. Hensel, previously covering the Northeast, transfers to the Lake States.

Swan is a graduate of the New York State Ranger School and has served as a timber cruiser, forester, surveyor,

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woods superintendent, superintendent of wood procurement, and assistant woodlands manager with the Canadian International Paper Company on various operations in Canada, and with Finch, Pruyn and Company and the Great Northern Paper Company in the U. S. He saw service with the U. S. Navy during World War II as a member of the Underwater Demolition Team in the Pacific. He joined APA after serving as district sales manager of the Wright Saw Division of Thomas Industries since 1955.

The appointment fills the vacancy caused by the fatal illness of W. A. Johnson in January.

AFPI Office in Denver Opens

Establishment of a Denver, Colo., field office for American Forest Products Industries of Washington, D. C., has been announced by C. A. Gillett, AFPI managing director.

Alan O. Miller, until recently assistant manager of the Yakima, Wash., Chamber of Commerce, has been appointed AFPI district manager for Colorado, Wyoming, Nebraska, and Kansas.

He will have office at 401 Ross Bldg., 1726 Champa St., Denver 2, Colo.

RALPH S. HOSMER
Cited for contribution to forest history

Texas Firm Reports Record Reforestation Project

Reforestation of 23,000 acres was carried out by the Southwestern Settlement and Development Company, Jasper, Texas during the 1957-1958 planting season. Planters used 20 million seedlings.

Seedlings came from the nursery of the company, part of the East Texas Pulp and Paper Company, and were planted during a 3½-month period. The company plans to reforest approximately 100,000 acres in the next five years.

Allied

Forest History Foundation Elects Officers

At the annual meeting of the Forest History Foundation, held April 23 in Saint Paul, Minn., officers were elected to serve during 1958-1959.

The new president is Dr. Theodore C. Blegen of the University of Minnesota, and vice president is Dr. Ralph W. Hidy of Harvard. Both are well-known historians who have written widely on business history. Ellwood Maunder was re-elected executive director.

The board of directors, numbering 32, is composed of historians, business men, and foresters. The foresters elected are Henry Clepper, George L. Drake, F. H. Kaufert, David T. Mason, A. D. Nutting, E. L. Demmon, and Emanuel Fritz.

Three special citations were made for outstanding contributions to the history of forestry and forest industry. One went to Ralph S. Hosmer of Ithaca, N. Y., professor emeritus of forestry at Cornell University, who was elected a Fellow of the Foundation.

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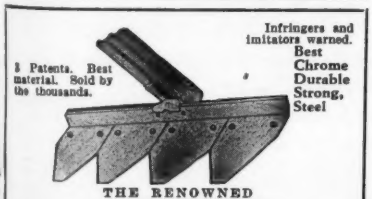

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Index to Advertisers

	Page
Adirondack Forestry, Inc.	461
American Chemical Paint Co.	445
Atkinson, S. Gayley	460
Banzhaf, George & Co.	462
Bartlett Mfg. Co.	444
Belanger & Bourget	459
Bozett, Wm. J.	461
Brady, Jos. H. & Assoc.	453
Caterpillar Tractor Co.	443
Clifton, Thomas C.	462
Coile, T. S.	459
Crank, Porcius F. Jr.	462
Cranston, Keith	459
Eastman, Wm. A., Jr.	460
Fechheimer Bros. Co.	454
Forest Seeds of Calif.	463
Forestry Suppliers, Inc.	386
Greenacres, Inc.	460, 462
Guthrie, John G.	462
Hall, Albert G.	460
Hall, Jack M.	461
Hammon, Jensen & Wallen	461
Haynes Mfg. Co.	452
Homelite Corporation	4th Cover
Keene Forestry Assn.	463
Knoth, Robert F. & Co.	460
Kraemer, J. Hugo Assoc.	462
Kurfew, Inc.	463
Lemieux, Frank J.	460
Lind, A. L. Co.	463
Lowther, Harry A. Co.	456
McCulloch Motors Corp.	447, 455
Mall Tool Co.	424, 425
Meadows, Ben	444
Motorola	3rd Cover
Musser Forests	454
National Agricultural Supply Co.	444
Nelson Company	451
Northern Tree Co.	460
Pacific Weather Service	454
Panama Pump Co.	449
Pomeroy & McGowin	459
Pond & Moyer	462
Poulan Saw Co.	446
Prentiss & Carlisle	461
Price, Wm. H.	460
Rich, C. H. Forest Fire Tool Co.	463
Rootspred Tree Planter	456
Sanders, Paul M.	461
Sebrell, J. B. Corporation	454
Sewall, James W. Co.	459
Silva, Inc.	463
Smith, D. B. Co.	2nd Cover
Southern Coatings & Chemical Co.	458
Southern Seed Co.	463
Southern Timber Mgmt. Service	462
Stock, John W.	462
Stratex Instrument Co.	452
Timber Mgmt. Service	460
Tree Farm Mgmt. Service	461
Utility Tool & Body Co.	454
Vermeer Mfg. Co.	450
Western Fire Equipment Co.	457
Whitfield, R. A. Mfg. Co.	457
Winslow, Paul T.	461

FPRS Annual Convention at Madison

The Hon. George H. Roderick, Assistant Secretary of the Army, will be the official luncheon speaker on the program of the Twelfth National Meeting of the Forest Products Research Society, to be held at Madison, Wis., June 23-27, according to Program General Chairman Robert L. Hiller.

The Wisconsin Governor, Vernon W. Thomson, will extend his state's official welcome to the Society's members and guests. Men who will be on the welcoming program are: Dr. Frank H. Kaufert, president of the Society, Dr. J. A. Hall, director of the U. S. Forest Products Laboratory at Madison; V. L. Harper, asst. chief, U. S. Forest Service; Dr. Winton Patnode, director of research, Weyerhaeuser Timber Company; and Dean Hardy L. Shirley, New York State College of Forestry.

The new FPRS executive home office building is scheduled to be completed in time for exhibition to attendees at the convention. Dedication ceremonies are planned for Sunday, June 22, with national and state leaders in government, education, and the forest products industries on hand.

The Hotel Loraine will be headquarters for the convention, with the nearby Park and Edgewater Hotels providing suplemental facilities.

CEA Plans Annual Meeting

Members of the Conservation Education Association will discuss various media for grass roots education in conservation when they meet for the fifth annual conference at the University of Utah, Salt Lake City August 18-21.

Officers of the Association are President C. W. Mattison, U. S. Forest Service, Washington, D. C.; First Vice-President Edward M. Ray, Conservation Training School, Roscommon, Mich.; Second Vice-President Stanley D. Muliak, University of Utah, Salt Lake City; and Secretary-Treasurer Wilson F. Clark, Eastern Montana College of Education, Billings.

Equipment & Supplies

Measuring Chain Cutter Angles

Angle Pal, a transparent device to measure chain cutter angles, is being manufactured by the Oregon Saw Chain Division of Omark Industries, Inc., 9701 S. E. McLoughlin Blvd., Portland 22, Ore.

To check accuracy of a filed saw chain, user places Angle Pal on top of chain; matches 35-degree lines on Angle Pal with top plate angles on cutters. Side plate angles are checked by aligning 90-degree guide lines on Angle Pal with side plate angles of cutters. The slightest difference is easily seen through the transparent measuring tool. Corrective filing may then be done. Made of strong polystyrene, Angle Pal has markings for both left and right hand cutters, is six inches long and weighs less than an ounce.

They are available from any Oregon distributor or dealer.

Forestry Employment

S.A.F. members are privileged to insert one 60-word advertisement in this column without charge. Forest industries desiring to employ foresters may insert advertisements at the rate of $4 per column inch. Copy must be received by the end of this month for an advertisement to appear in the issue after next.

Obviously, the Society cannot assume responsibility beyond making it possible for prospective employee and employer to enter into negotiations.

Position Available

Opening available for young assistant or associate professor in forest utilization and technology, beginning September, 1958. Ph.D. necessary, or requirements near fulfillment. Some teaching experience and interest in research desirable. Salary range (9 months basis) $6500 to $7000, depending on qualifications Apply to Dean, College of Forest, Range, and Wildlife Management, Utah State University, Logan, Utah.

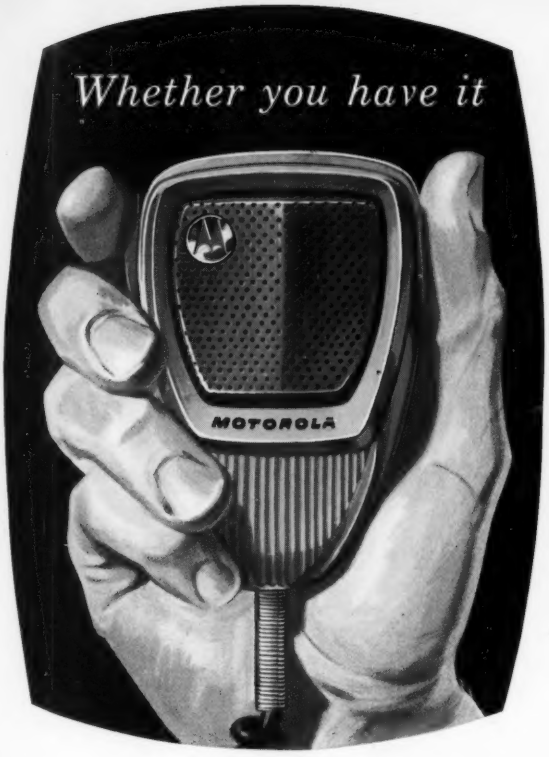
Positions Wanted

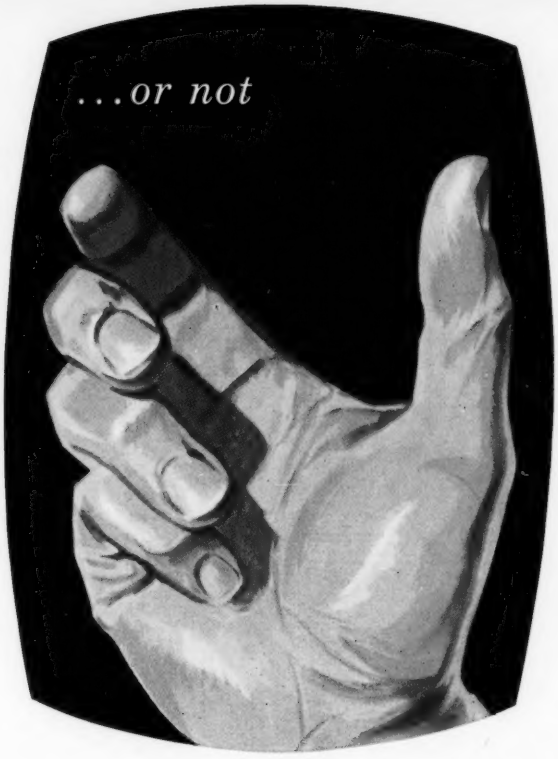
Forester, B.S.F., 1951. Age 33. Experience includes forest insect control, photogrammetric mapping, and photo interpretation. Also have over 6000 aircraft pilot hours experience. Desire position in Northeast with minimum travel. **Box O, Journal of Forestry, Mills Building, Washington 6, D. C.**

Alert, versatile, ambitious forester: B.S. 1936 and graduate studies; family man in 40's, with diverse forest management, P. R., and research experience of 16 years, mostly in Southeastern states, desires to relocate in similar position. **Box Q, Journal of Forestry, Mills Building, Washington 6, D. C.**

Forest taxation specialist, desires position with private industry. Particularly interested in Pacific Northwest. **Box R, Journal of Forestry, Mills Building, Washington 6, D. C.**

Forester, B. S. Forest management, Colorado State Univ., 1955. Age 25, married, two children. Three years U. S. Air Force, 1/Lt., jet flight instructor, commercial pilot and instrument rating. ASEL. Release from active duty, November 1958. Experience with United State Forest Service, general timber management work in Southwest; marking, scaling, cruising, stand improvement. Desire position utilizing both forestry and aviation experience. **Box S, Journal of Forestry, Mills Building, Washington 6, D. C.**





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4./CUTS EVERYTHING up to 10 feet in diameter. Famous Homelite high-compression, short-stroke engine gets its power from most advanced cylinder design. Large cooling fins provide 12% more cooling area . . . shorter piston stroke cuts wasteful friction, increases engine life, reduces gas consumption.

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